DESIGNING A TAXONOMY FOR VIRTUAL MUSEUMS FOR THE USE OF AVICOM PROFESSIONALS

by

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Designing a taxonomy for virtual museums for the use of AVICOM professionals

This thesis aims to go beyond the concept of so called 'virtual museums'. In this work I will attempt to trace a new definition of the term 'virtual museum' providing the concept with renewed dignity, comparable to ICOM'S definitions of museums and other existing definitions of the concept. To do so the main part of this thesis is about creating a meta-model of taxonomy capable of including all the experimentations that have taken place in the field of 'virtual museums' in the last 20 years. In this direction I have investigated the concept of the museum as a medium as described by McLuhan and other thinkers, both within and outside the field of museology. The discovery of an unabridged work by McLuhan on technology in museums endorses, and opens a discussion on how technology is intended to be used for the communication of heritage. Another aim of this thesis is to investigate how museum professionals can deal with the new role of Information Technology in communicating heritage. In this thesis I intend to respond to the need of museum professionals both inside and outside ICOM for definitions and clearer understanding concerning the following questions 'What is a virtual museum? Can it be comparable with a 'real' museum? What different kinds of virtual museums can be discerned in past experimentations? Can they be included in a taxonomy? How does this change the day to day work of museum professionals in accordance with the new technological potential for the communication of heritage?

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Author's Declaration

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Graduate Committee.

Relevant scientific seminars and conferences were regularly attended at which work was often presented; external institutions were visited for consultation purposes and several papers prepared for publication; and creative work was shown at international curated exhibitions:

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I. Definitions

1.1. General introduction and thesis statement

The main aim of this thesis is to provide an answer to the question of whether virtual museums can be considered equal to other museums.

To answer this question, I have researched different definitions of museums and virtual museums from different periods, concentrating on the official definition given by ICOM, due to its prominent role in the community of museum professionals in the field of definitions and lines of conduct and ethics.

In the attempt to provide a new definition of the virtual museum, a parallel process emerged where I took into consideration certain definitions of the virtual museum, both from before and during the research period, as well as from the observation of the growing number of so-called 'virtual museums' from direct experience, literature review, launch events and academic and professional community meetings. The taxonomy emerged from the observation of these examples of virtual museums, using an observation-grouping methodology, as employed in the construction of other taxonomies in the natural sciences, with the aim of providing an easily understood key for museum professionals. Correspondences between museums and virtual museums emerged in tandem with this activity, allowing me to arrive at a definition of virtual museums fitting in with observed reality. The discovery of an unpublished work by

McLuhan was crucial throughout the research process due to the fact that virtual museums mainly operate and exist in the field of new media, since tangible museums have now started communicating with new media, making it of crucial importance to give a new status and definitions of the museum as a medium.

The McLuhan document, as explained in Chapter 2, provides a new perspective on this research, and is of crucial importance in the context of museums using new media, making a new contribution to knowledge in the field.

The thesis concludes with a brief chapter with some advice for the community of museum professionals, focussing on proving the validity of the taxonomy, through a comparison of apparently completely different types of virtual museums and a peer review by AVICOM museum professionals.

The new knowledge embodied in this thesis includes a new definition of the virtual museum, a meta-model of taxonomy that can include all the experimentations in the field over the last 20 years, much more easily comprehensible for the community of museum professionals than other taxonomies employing a technological frame of reference, as well as advice to this community in dealing with the role played by technology in the communication of heritage. Another goal of this thesis is to contribute to discussion in ICOM and AVICOM.

1.1.1. Methodological explanation

During these years of research I have gone deeper into the concept of the virtual museum in several ways, the first being an investigation into definitions. I played an active role in ICOM Italy and in AVICOM, becoming the coordinator of the Audio-visual and New Technologies Commission for ICOM Italy, and my election to the

AVICOM executive board, after participating in the jury of the FI@MP Prize in Turin in 2009. This allowed me to enjoy, much more so than in my previous research work, a privileged viewpoint over a wide range of experiments in the field of virtual museums, as well as meeting qualified museum professionals and gaining, through my participation in the organization, the firm belief that virtual museums should fulfil all aims of museums as set out by ICOM.

My taxonomy emerged in the same way. My inquiries have progressed in different stages over nine years of research, together with my membership of ICOM and then AVICOM.

In the first place, in order to map the complexity of the phenomenon of virtual museums, in 2004 I started to compile a table of examples of virtual museums, websites as well as different technological supports evolving over these 9 years. This involved a catalogue of a series of bookmarks, as well as a list of CD-ROMs, and DVDs, and even videogames on the different games platforms developed during the long period of my research, as well as examples of museum guides, and the first models of the Kindle, Nintendo Game Boy, and Sony PSP.

As the reader is sure to have recognized, at the end of my research period, in line with the unstoppable progress of technology, a huge proportion of my bookmarks were now no longer operational, as was the case of virtual museums on CD-ROM developed for Windows 98/2000, that were no longer working by the time of the new release of the operating systems. The Nintendo Game Boy, old models of the Kindle, as well as PSP technologies had become partially obsolete due to software or hardware upgrades. This produced two distinct levels of awareness, in the confirmation that my whole catalogue no longer had any reason to exist, as it was almost completely unusable.

In the first place the definition of 'virtual museum' had to take into account the volatility of technological formats. In the same way as no-one would dream of building a real museum with walls of sand and cardboard, likewise any efforts in the field of technology, however praiseworthy, not least from the budgetary point of view, had to take into account the unstoppable progress that is at the very nature of technology. This led me to create a definition of virtual museums, that, as is reported in this thesis, supports museums in the awareness that 'intangible' museums can exist today and with the same standing as tangible museums; however this type of museums must comply with the standards of the international community, and also have a proper maintenance plan, designed to last far beyond the initial period and press releases. This has been reflected on my chapter covering new definition of virtual museums on page 71.

1.1.2 Overview of chapters and topics

In Chapter 1 I start by dealing with the problem of defining museums and virtual museums. What are museums and virtual museums exactly? What about the relationship between virtual and tangible museums? What exactly are the new technologies that support museums in communication and in achieving their aims?

I have given some definitions that work for me, as well as the reasons why they do so. I worked around the role of the museum, using UNESCO-ICOM definitions and other official documents, as well as concepts from new Italian museology, the so called 'museology of wonder' (Gennaro, 2007; Pinna and Sutera, 2000; Andreini, 2009) because this seemed to me to be the most suitable way to approach museum-related phenomena, including the points of view of museum visitors. My involvement in ICOM

and AVICOM also meant that one of the main goals of this thesis is to contribute to discussion in this professional community.

In the second place, it was necessary to provide a context for a reflection on the definition of 'new technology' around which the experiments of new museology had taken place over recent years, and this reflection, contextualized with the history of this experimentation, was part of the corpus of this thesis. My research into a definition of 'emerging technologies' to be applied to this history takes shape on page 41, and is the prerequisite to the new definition of the virtual museum that I introduced in the previous section.

This led me to address the phenomenon of virtual museums from the point of view of communication, and having had the luck to come across an unpublished work by McLuhan on the subject, I was able to dissect the use of technology in the field of museum exhibitions and communication with a reading easily understood by the community of museum professionals with a background in the humanities as opposed to IT. This reflection can be found in Chapter 2 of this thesis, on page 84.

In Chapter 2 I go on to consider the museum as a medium, mainly thanks to the discovery of a rare and strangely neglected document by McLuhan and Harley Parker (McLuhan, Parker and Barzun, 1969). I work through the role of the medium-museum through new technology applications, and the idea of 'space', that is to say the channel of the museum medium, and how it is made accessible to visitors.

When the virtual museum is considered as a medium, it takes on the same dignity as the

tangible museum. This definition of the museum makes the virtual museum seem a completely 'real' museum, even if it uses technology to approach visitors. However, if the museum and the virtual museum are both seen as media, then this remediates (Bolter and Grusin, 2000) the tangible museum with new technologies, and makes it a medium too. The sense of 'space', the tangible museum's channel, becomes virtual space, cyberspace, and this concept can be predicated in many ways; according to the different examples of virtual museums we have seen over the years.

Finally, however, my 'census' of the experiments in the field of virtual museums over these nine years has allowed me to highlight some common characteristics among the many reported cases which sometimes do not even remain in the memory of websites, making for a taxonomy of virtual museums easily understood by the community of museum professionals with a background in the humanities, who did not have sufficient technological understanding to allow them to weigh up different technologically-based experiments and the communication models that are the foundation of the communicative concept of the examples of virtual museums.

Chapter 3 constitutes the main part of my research: following the premises and theories listed in the previous chapter and concerning the attempt to create a taxonomy of virtual museums, using the most important case studies from over 20 years of experimentation, I have identified six 'categories' of virtual museum; these are not to be taken chronologically but rather consequentially in order of complexity and experimental character.

In the final chapter, I have concentrated on the new role of museum professionals in the field of experimentation in virtual museums and how the different International Committees such as ICOM, ICTOP and AVICOM are dealing with working practice in museums, in order to cope with the application of new technology. I then conclude my thesis tracing my intentions for future research.

This process, explained in more depth in Chapter 3 on page 145, can be assimilated into Foucault's scientific methodology, that can be consulted in the appendix. I then asked my AVICOM peers for feedback and evaluation on my theory and the results were used for a review of the taxonomy.

1.1.3 Introduction to Chapter 1 – Definitions

This first chapter is about setting boundaries for the other chapters. In this chapter I have attempted to establish the meaning of certain important concepts that are the basis for further research. I have investigated what I mean when I talk about museums, archives and libraries. In these important chapters I use ICOM as a benchmark, as I do in other parts of my research and in other topics, because I find it provides an authoritative definition of the museum itself. I also use definitions from other organisms forming part of UNESCO or from governmental authorities with the ability to make a *super partes* definition that will fit in with the aims and the purposes of the object of the definition itself.

After defining the museum and its differences with archives and libraries, I also start investigating the new role of museums in dealing with emerging technologies such as reconstruction technologies, augmentation technologies, hybrid technologies and, wholly digital technologies etc.

I then go on to give my definition of the virtual museum, putting special emphasis on the concept of wonder, due to the omission of the emotional role of the museum and providing examples of virtual museums together with past definitions of virtual museums.

1.2 Definitions of museums

In this section I focus on definitions of the museum. Defining museums and virtual museums is crucial for my work, and in the following chapters I intend to analyse the history of ICOM's definition of museums, as well as some other definitions of virtual museums that I find significant.

ICOM is a UNESCO partner committed to supporting the work of museums and museum professionals. I have taken ICOM's definition of museums as my main benchmark due to its status as the most important museum institution in the world with a strong commitment to the conservation, continuation and communication of the world's natural and cultural heritage, present and future, tangible and intangible. Created in 1946, ICOM is a non-governmental organization (NGO) maintaining formal relations with UNESCO and having a consultative status with the United Nations Economic and Social Council. As a not-for-profit organization, ICOM is financed primarily by membership fees. It is also supported by various governmental and other bodies such as UNESCO for whom it carries out part of its museum programme. Based in Paris, France, at the UNESCO headquarters, ICOM's head office houses both the ICOM Secretariat and the UNESCO-ICOM Museum Information Centre. The 21,000 members of ICOM in 146 countries participate in the national, regional and

international activities of the organisation: workshops, publications, training, twinning programmes, and the promotion of museums through International Museum Day (May 18th, annually). Members participate in the activities of 114 national committees and 30 international committees. Some national committees have also joined together regionally in order to strengthen their activities. ICOM is affiliated with 15 international associations[1].

The international *super partes* character of the organization means that its definitions in the museum sector are the most reliable in the world. ICOM has also had to face the problem of definitions of museums since its foundation.

The definition of a museum has evolved, in line with developments in society. Since its creation in 1946, ICOM has updated this definition in accordance with the realities of the global museum community[2].

There is one other significant definition of the museum: that is given by Marshall McLuhan in an unpublished document on museums and technology that I have presented in this research and which will be quoted from extensively in the chapter about the museums as medium.

ICOM's first definition of the museum dates from 1946:

> *The word 'museums' includes all collections open to the public, of artistic, technical, scientific, historical or archaeological material, including zoos and botanical gardens, but excluding libraries, except in so far as they maintain permanent exhibition rooms.*[3]

This definition focuses on collections, and therefore on objects and unspecified

1 http://network.icom.museum/avicom/about-us/avicom/L/10/. Retrieved on 01-06-2014
2 http://icom.museum/the-vision/museum-definition/. Retrieved on 01-06-2014
3 ICOM Constitution, article II, section 2 1946, http://archives.icom.museum/hist_def_eng.html. Retrieved on 01-06-2014

'material', centring on the action of displaying this material. The second most significant definition dates from 1951.

> *The word museum here denotes any permanent establishment, administered in the general interest, for the purpose of preserving, studying, enhancing by various means and, in particular, of exhibiting to the public for its delectation and instruction groups of objects and specimens of cultural value: artistic, historical, scientific and technological collections, botanical and zoological gardens and aquariums. Public libraries and public archival institutions maintaining permanent exhibition rooms shall be considered to be museums.*[4]

The focus is now on the permanent establishment, the opposition with libraries disappears if they have exhibitory intent and the public have become a target. The latest definition, after those of 1961, 1974, 1989, 1995 and 2001, is as follows:

> *A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment.*[5]

The stress is on the institution and this argument will be important when we consider virtual museums together with other issues.

ICOM's preliminary Dictionary of Museological Terms defines museums as permanent institutions in the service of society and its development, where the institution is a man-made construction in the museological field, organised in order to enter into a sensory relationship with objects. The museum institution, created and maintained by society, rests on a collection of standards and rules (preventive conservation, the prohibition to touch objects and the display of substitutes while presenting them as originals) founded on a value system: the preservation of heritage, the presentation of works of art and unique pieces, the dissemination of current scientific knowledge, etc. Emphasising the institutional nature of museums means strengthening their normative role and the

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4 ICOM Statutes, article II – Definition, July 1951, ibidem.

5 ICOM Statutes, article III – Definition of Terms, adopted by the 22nd General Assembly (Vienna, Austria, 24 August 2007), ibid.

authority they hold in science and the fine arts, and the idea that museums remain 'in the service of society and its development' (Mairesse and Desvallées, 2010: 43-44).

However something more important lies in this last definition, that is strongly functional, stressing prevalent museum functions. We are being asked to ask ourselves about the functions of museums: are they to present their collections in the most spectacular way possible or is it their role to increase global knowledge of society as a whole? To return to ICOM's definition: "*A museum […] acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment*"[6].

What is to be predominant in the functions of museums? To communicate and to exhibit, or to acquire, to conserve and/or to research?

In reply to this question I would like to refer to this text that is intended to be the anticipation of ICOM's official dictionary of museological terms[7], at the entry 'Communication' which is seen within the museum context as representing both the presentation of the results of research undertaken into the collections and as the provision of information about the objects in the collections. This interpretation sees the exhibition both as an integral part of the research process and as an element in a more general communication system. This is the rationale which prevailed in the PRC (Preservation–Research–Communication) system proposed by the Reinhardt Academie in Amsterdam, which includes under communication the functions of exhibition, publication, and education fulfilled by the museum (Mairesse and Desvallées, 2010:

[6] ICOM Statutes, article III - Definition of Terms, adopted by the 22nd General Assembly (Vienna, Austria, 24 August 2007), ibid.

[7] The book 'Key concepts of Museology' was published in 2010 with the premise to be an anticipation of a comprehensive dictionary of museological terms. It was published by Mairesse and Desvallées in 2011 for the same publisher of 'Key concepts of Museology'.

29).

According to Mairesse, the application of the term ‘communication’ to museums is not obvious, in spite of the use made of it by ICOM in its definition of the museum up to 2007. This definition states that a museum “*acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment*”. Until the second half of the 20th century the main function of the museum was to preserve amassed cultural or natural treasures, and possibly to display these, without explicitly expressing any intention to communicate, that is to convey a message or information to the receiving public (Mairesse and Desvallées, 2010: 29).

For Mairesse the idea of communication aimed at a specific target public is a late addition, where the idea of a museum as message appeared relatively late, with thematic exhibitions principally aimed at education; on the other hand, the receiving public remained the great unknown for a long time, and it is only quite recently that museum visitor studies and visitor peer-reviews have developed. From the perspective favoured in ICOM’s definition of museums, museum communication would appear to be the sharing, with different publics of the objects in the collection and the information resulting from research into them (Mairesse and Desvallées, 2010: 29).

The concept of ‘sharing’ relates to information on the objects from the collections, and there is a precise connection to the concept of ‘sharing’ related to new technology, in particular to web 2.0. The document relates explicitly to McLuhan, in a way that I cannot agree with, by stating that the specificity of communication as practised by museums can be defined into points: it is most often unilateral, that is, without the possibility of reply by the receiving public, whose extreme passivity was rightly

emphasised by McLuhan and Parker (McLuhan, Parker and Barzun, 1969; McLuhan et al., 2008).

McLuhan talks about passivity in his document, but in a different way. For example, quoting the conversation where he states that the optimum response is that of euphoria and amusement, not passivity, in a world where show business is the main business (McLuhan, Parker and Barzun, 1969: 39).

So there is a proposal in opposition to the passivity of the public. On replying to a question on an unsuccessful exhibit at the 1967 World Fair, McLuhan stated that the mistake was putting the audience in a passive state of relationship (McLuhan and Parker, 1969: 42).

Following McLuhan, I must note that these ICOM definitions are in line with Roy Ascott's concern in denouncing problems with the communication role of museums. Ascott takes issue with those who assert that the museum's function is simply to control information, since he believes that in truth it serves and has always served to control meaning, to assist in the dissemination of ideology, to shape consciousness. For Ascott most educational programmes are little more than cosmetic, serving only to obscure the deep processes of cultural control that are always at work in the semiology of museum architecture, the despotism of commission and omission of the paintings on the wall (Ascott and Shanken, 2003: 342).

At this moment it is important to give a definition of archives and libraries. ICOM Italy's activity is about to switch from being exclusively devoted to museums, to coordinating museums, archives and libraries, with its creation of MAB-Italy Commission: 'Museums, Archives and Libraries'[8]. The following section is dedicated to

[8] http://www.mab-italia.org. Retrieved on 01-06-2014

giving a definition of archives and libraries and establishing similarities between them.

1.3 Museums, archives and libraries

> *As an entree for the whole problem for the museologists or the curators might it not be useful to point out that* ***the museum as a retrieval system for classified objects is not going to be acceptable very long****. People now feel the need to have a sense of the total surround of these objects and the total environment that produced them. And the sort of culture that produced them. They like to see them in their setting in the sort of form in which they originally existed, and, as it were, in action.* (McLuhan, Parker and Barzun 1969: 1)

In this declaration McLuhan appears to be defining certain kinds of museums in a way that makes them seem similar to archives, or libraries. I am aware that there may be some museums in the world that fit this definition, but from the existence and the acceptance of museological standards, such as those defined by ICOM, and on the basis of a shared, undisputed definition of museums as provided by ICOM, it is not common to find museums as "*a retrieval system for classified objects*" (McLuhan, Parker and Barzun, 1969: 1).

However, as will be shown by the examples I will use in the rest of my research, there are clear and universally shared and agreed upon examples of virtual museums that can be considered as "*a retrieval system for classified objects*" (McLuhan, Parker and Barzun, 1969: 1) too (see *Europeana*, and my Category D of Virtual Museums). The problem here is the deficient consideration of the definition of archives (and libraries), giving them the 'status' of virtual museums. It is important to take note of these definitions and to match them with some kind of consideration for virtual archives and libraries.

Bearman (from 1981 to present, but specifically in 2007) and Barton (2005) wrote about

the main differences between virtual museums and digital libraries or archives in general and Bearman devoted part of his research work to the field of digital archives together with Jennifer Trant. It is important to stress here that the Museum and the Web conference publication was born as 'Archives and Museum informatics'. The points of contact between digital archives, digital libraries and virtual museums will be considered in general in Chapter 3.

The Society of American Archivists published its own glossary of archival terms. The definitions in the SAA glossary have been widely accepted as the basis for discussion of archival terminology in North America and have been the starting point for subsequent efforts to define American archival terms. Since publication of the SAA glossary, however, many archivists have concluded that some of its definitions require revision and that additional terms should be included. Teachers of archives administration and authors of basic archival texts, consequently, have developed their own glossaries that revise, update, or expand the 1974 work. At present, no single glossary of archival terms can be considered definitive[9]. Archival Institutions were defined by Daniels in 1984 as institutions holding legal and physical custody of noncurrent documentary materials determined to have permanent or continuing value. Archives and manuscript repositories are archival institutions (Daniels in Daniels and Walch, 1984).

Archives are defined as:

1. the noncurrent records of an organization or institution preserved because of their continuing value;
2. the agency responsible for selecting, preserving, and making available records

[9] http://www.archives.gov/research/alic/reference/archives-resources/terminology.html. Retrieved on 01-06-2014

determined to have permanent or continuing value;

3. the building in which an archival institution is located. (Daniels in Daniels and Walch, 1984)

Concerning libraries, a historical definition covering the genesis and mutations in the history of UNESCO's definition of the library, states that since the inception of the concept of the public library, hundreds of definitions have been produced by different stakeholders, often emphasizing extended responsibilities and commitments to society. Rahman provides three definitions of the library provided by UNESCO:

1. in 1949 UNESCO defined the public library as a democratic institution, established under clear authority of law to provide facilities to pursue education as a life-long process;
2. in 1972 UNESCO defined the public library as a 'living force' for education, culture and information. It also emphasized cooperation between libraries in a country and considered the public library as a centre for communication and information;
3. after a lapse of 22 years UNESCO again defined the public library as an institution established to meet the new demands which arose due to the advent of new technology and to prepare the community to face the challenges of the 21st century. (Rahman, 1996)

On the other hand Aspenson provides a definition of the library that may be useful for comparison with the definition of the virtual museum, stating that libraries must provide inspiring physical spaces for interaction, where the very definition of the word library is

rooted in the idea of a physical place where materials are housed. However this physical definition is quickly evolving and being supplanted by the library acting as both a physical and a virtual place. The most important ongoing transformation in the concept of library as a place is the fact that libraries are being used more than ever as places of interaction and not as repositories of materials. Public libraries are serving as community meeting and living rooms (Aspenson, Poling and Scherer, 2011).

As we will see in further chapters, given the nature of digital information and databases and taking into account the definitions of library and archives, it should be observed that there is a very small difference between virtual museum projects that can be considered virtual archives (even less so in the case of virtual libraries). The reader should refer to my taxonomy of virtual museums for a deeper analysis of this question.

1.4 The organization of information in virtual museums

In order to concentrate on an easily understood definition of the virtual museum for museum professionals, it is important to underline certain concepts on how the museum can be considered as an 'information utility' (MacDonald and Alsford, 1991) I started my research into museums and technology because knowledge patterns in contemporary experience are changing from an integration of theoretical models and practical experiences towards brand new modalities of expression, integrating events, reflections and activities in virtual worlds with events, reflections and activities in real life.

In this context, mass consumption of institutions and museums is changing from a walk down a gallery past a collection of objects, to the predisposition of environments where visitors can enjoy a combination of objects and experience.

These two elements have placed the contemporary idea of the museum model into a situation of continuous evolution: all museums are changing from a contemplative to an active model, and at the same time the instruments for providing visitors with experiences and making them think have changed.

The integration of old and new models of knowledge is now out of date, and so there is a strong need for a new model for new knowledge integrating the model itself in a combination of vision / contemplation, passive gaze and activity.

> *...museum will change from a static repository of information (akin to an archive) to a more dynamic, interactive information source (more like a library)* (Besser, 1987: 14-17)

Although museums can evolve through a variety of content, my current idea concerns a technological museum, dedicated primarily to the collection and display of artistic data and objects exhibited within the metaverse (Internet or a 3D world as Second Life), although artistic content from elsewhere, i.e., disseminated in nature, has not yet been excluded. Thus, the museum in question is an art museum, although an effort will be made for the findings and methodologies developed during this research to be applicable to other typologies of museums as well.

The challenges imposed upon museums by both audience and technology have been covered by Bearman and Geber (2007), according to whom audience demographics are rapidly reconfiguring themselves by changes in increased levels of world income resulting in global tourism and a consequent breaking down of cultural common ground between visitors as well as a breakdown in cultural authority whereby visitors look for personal relevance instead of authoritative documentation.

Object, space, action and memory, on the other hand, are rapidly reconfiguring themselves through technology. While objects can be information carriers, space can be aware of who is near it or in it and can convey information to and from many sources akin to that space. Memory (ours, that of objects and space, and ultimately that of 'culture') will be able to recall what was said about things, experiences, and events, becoming cumulative, collective and cultural. Action will not be restricted to place and people. We will be able to act at a distance and things will be able to act on their own. Many objects will act as software agents, some will be able to change their properties based on programmable materials, and others will have components that receive information and act on it.

In the era of web 2.0 domains, where new technologies rapidly approach museums, we need a different definition of the museum. The masterpieces have already gone outside the walls, coming into the web, in CD-ROMs, on smart-phones and tablets. According to Andrews (Andrews and Schweibenz, 1998) a virtual museum is intended as a logically related collection of elements composed in a variety of media that lends itself to transcending traditional methods of communication; it has no real place or space, and dissemination of its contents are theoretically unbounded. The main activity of museums therefore is to present to a wide audience sets of objects that represent the cultural heritage of a particular region, time or people (Andrews and Schweibenz, 1998).

My question at the beginning of my research work was, in the words of Pearce, how to make the facts of these objects sing to the virtual visitor? How can we enable them to have an experience? The first requirement for museums is to recognize that the networked environment is interactive, and therefore can be user driven, enabling it to

respond to visitors rather than simply pump information at them (Pearce, 1994: 198-201).

A recent paradigm shift in museology has taken museums from being the repositories/display devices of 'objects', to being repositories/display devices of 'information' alongside 'objects' (Alsford, MacDonald and Phillips, 1989; Alsford and MacDonalds 1991; Alsford and MacDonalds, 2010; Pearce, 1994; Washburn, 1984). This all important paradigm shift will be considered in the light of the proposition of a three dimensional, virtual museum in a metaverse. In this context spatial regeneration gains importance, since unlike static objects, information is in a constant state of flux and growth. Since virtual constructs can incorporate high levels of spatial transformation, the requirements of virtual museum architecture will be evaluated in the light of this heightened level of informational content manifest in the post 1980 museum.

The meaning of virtual museums themselves however, should be sought in the changing nature of information itself, which is ever increasingly digitized into massive conglomerates of data structures that are in need of management and navigational systems. Digitized data is, of course, the prerequisite for a virtual museum; conversely however, it can be argued that the massive amounts of data available also seek new propositions in the construction of museums whether real or virtual. While hyperlinked web 2.0 museums have no trouble doing justice to the diversity of information displayed as well as enabling visitors to roam freely within that content, 3D virtual museums in general seem to adhere to a somewhat linear navigational system. Thus the three dimensional, virtual Certosa (2007) project of the of Bologna City Council, in which I was involved as a museologist, falls short of providing the richness engendered

by a linked, cross-linked and cross referenced navigational system. Indeed overall, in Italy, where 3D virtual museums have been investigated and developed fully, most examples seem[10] to lack these attributes that could be seen in the no longer existent hypertext, albeit 2D, interface of the online Carlo Crivelli museum, which despite its disseminated characteristics had the advantage of presenting data and objects collected from throughout the world.

Where 2 dimensional online museums do fall short is the generation of 'aura' (Benjamin, 1936) i.e., the sense of awe and reverence one experiences in the presence of unique works of art, as well as that of 'presence', i.e., "*the subjective experience of being in one place or environment even when one is physically situated in another"* (Singer and Witmer, 1998), both of which I believe to be crucial for the engenderment of a truly functional virtual museum. Indeed, an integration of cybernation, with the requirements specific to virtual museums will inevitably constitute a major portion of the validation of my premises.

Yet another argument that would favour the construction of 3D virtual museums over two dimensional interfaces lies however in the nature of the display, i.e., the information itself. Stand-alone display devices utilizing data that have already been worked on in real life museum settings (Onda et al., 2004). Today, in a climate where information itself has become embodied as object through data visualization it would not be beyond the bounds of the imagination to use data, i.e., the informational content which seems to prescribe the workings of the post 1980's museum as a structural framework for the materialization of the entire or partial architecture of a virtual museum. Thus, data visualization can be used not only in the service of the workings of

[10] Internet Culturale, http://www.internetculturale.sbn.it/genera.jsp?s=12&l=en. Retrieved on 01-06-2014

a museum, but also as a bridge between inner content and the outward manifestation. However, there is yet another facet to the relationship between data and architecture for museums. According to Argoski (1995) information collected by museums will "*be reused in a variety of ways and through different media*". This 'repurposabilty' of information would indicate multiple forms of embodiment of data as well as object, which in its turn would predicate the generation of architectural form that is capable of change and adaptability to the ever changing display/embodiment of the material contained within.

Another shift in my museological research has been the study of the conditions of the possibility of building a "*3D interface that can be navigated with a multi-dimensional architectural experience controlled and activated by on-line visitors*" (Singer and Witmer 1998; Hani, 2000). In this sense the Guggenheim Virtual Museum's project is significant. This project, born in 2000, is a *Simulacrum* in the Baudrillardian sense: the project was initiated, but then in 2003 it died and ended without any output: no on-line model, no virtual museum, nothing at all (except for some images in the quoted Domus paper and on the Guggenheim website[11]. However Rashid's intuition of multi-dimensional architecture activated by visitors remains the ultimate target in building a virtual museum. This was a significant project in the sense of a museum that can reflect the experience of going into a real museum but allowing us always to have a different experience, even on the 100th visit.

[11] http://www.guggenheim.org/exhibitions/virtual/virtual_museum.html. Retrieved on 01-06-2014

Figure has been removed due to Copyright restrictions.

Figure 1: Draft image of the hypothetical interface of virtual Guggenheim. Source: Hani, R., 2000, Guggenheim Virtual Museum. Domus 822, pp. 26-31

Another definition of museum relevant for my research work from the beginning is given by Roy Ascott, in his 'Telematic Embrace' (Ascott and Shanken, 2003).

Ascott started thinking about museums after his experience at the Ars Electronica Centre in Linz, and with the new NTT InterCommunication Centre in Tokyo in mind, he wrote about his scenario of the museum of the future:

> *I'd like to be a little outrageous here and tell you I have seen the future— and it's moist. It's where artificial life and artificial consciousness meet our own wet biology and our telematic society of mind.* (Ascott and Shanken, 2003: 342)

This definition is in line with the direction of the aforementioned references, of a museum capable of handling information instead of objects, . where, information and objects can and probably already are, handled by visitors to museums. In fact Ascott also asks himself about the space of the museum before the museum existed? He assumes that it was the site of collective memory; the site of celebration, even of hedonism; the site of creative imagination, danger, and daring. The site of transformation, especially spiritual transformation, played out in images that transformed the body (Ascott and Shanken, 2003: 342).

The museum as a place of wonder, transforming with its energy the minds and also the bodies of visitors. He goes on to talk about a museum that has a life of its own, that

thinks for itself, that feeds itself, takes care of itself, anticipates and participates fully in the chaos and complexities of culture that contributes constructively to the world in the exigencies of its paradigmatic transformation. A museum that is as much emotional as instrumental, as intuitive as ordered (Ascott and Shanken, 2003: 343).

And so Ascott arrives to his concept of 'Mindeum', stating how museums must adopt the strategies of the human brain and adapt to the techno-evolution of the human brain, in order to remain viable in the emerging technoetic culture. Rather than 'educating' our perception, they must learn the cultural consequences of our newly acquired faculty of cyberception, the technologically amplified faculties of perception and cognition. In short, the museum must become intelligent (Ascott and Shanken, 2003: 343).

And this is the direction, to put it optimistically, of the new museology that I have used to endorse my thesis in this research. And the information-objects handled in museums will also take us to the idea of virtual museums, in my mind as real as tangible museums. Ascott talks about the museum as a brain, richly embodying the associative thought of its own, very tangible cortex, the cognitive nexus of ideas, forms, structures, and strategies generated in interspace, the associative cognition, the hyperlinks of a profound connectivity, that constitute the field of becoming between the virtual and the real of the global domain (Ascott and Shanken, 2003: 343).

He shows how post-biological systems, the Net, intelligent architecture, and artificial life are significant elements in a new paradigm that opens up unprecedented pathways for development in art and science, as well as demanding new moral and ethical values for the kinds of worlds we can envisage and will eventually construct (Ascott and Shanken, 2003).

After considering this shift in the meaning and function of museums after the application of new technologies, it is important to acknowledge what is meant by the terms 'new technologies' and 'emerging technologies' applied to museums and virtual museums for enhanced communication of heritage, as will be seen in the following section.

1.5 Definition of new technology applied to museums

Here the technological part of this research must be defined. The main point to be made in this section concerns the idea of technology, an idea to be developed in relation to museums and heritage.

Museums use technology in many applications of their main activities: illumination, engineering, conservation of artworks, cataloguing, restoring and collecting objects. Focusing my research on museums' communication aims, I will concentrate on the technologies that help museums to communicate their heritage; not on technologies of illumination, conservation, cataloguing or restoration, neither on audio-visual techniques for exhibitions if they do not fit in with the definitions set out in the following subsections.

Approaching the issue of technology, and trying to clarify my ideas and intentions for this research I was unable to find an unambiguous definition of 'new technology' in order to focus on my field of research in this work. It would seem that the term 'new technology' itself is pointless, because it refers to technology such as the Internet that is over 40 years old. A definition of this concept became a question of urgency for me.

The term 'new technologies' would always seem to be pointless because it always begs

the question ‘new from when?’ (if this is not specified). They are better defined from publications and symposiums as well as emerging technologies, so I started focusing on publications and symposiums covering this field of study, such as the state of the world conference about new technologies: SIGGRAPH. I found out by looking at the programmes of all the conferences from 1974[12] up to now that the shift between what the panel called ‘new technologies’ and ‘emergent technologies’ happened in 1999[13], when Kathryn Saunders, from the Royal Ontario Museum, held the chair[14]. This means that the ‘umbrella term’ new technology, broader, vague and abused, became restricted to a stricter definition.

Another important starting point for me was the On-Line Business Dictionary. Its definition for ‘Emerging Technology’ states:

> *New technologies that **are currently developing or will be developed over the next five to ten years**, and which will substantially **alter** the business and social environment. These include information technology, wireless data communication, man-machine communication, on-demand printing, bio-technologies, and advanced robotics.*[15]

This definition points out that technology, in order to be defined as ‘new’, has to be developing at the present moment, thus saving Internet, still constantly evolving even if it is 40 years old. It also stresses information technology that is also involved in communication.

As Mairesse wrote at the entry ‘Communication’ in the draft dictionary of museological terms:

> *It appears nevertheless that the real task of the museum is closer to transmission, understood as unilateral communication over time so that each person can assimilate the cultural knowledge which confirms his humanity and places him in*

[12] The programs are online only from 1994 edition.
[13] http://www.siggraph.org/s99/conference/etech/index.html. Retrieved on 01-06-2014
[14] Interesting to note that she was involved in museums and heritage communication.
[15] http://www.businessdictionary.com/definition/emerging-technologies.html. Retrieved on 01-06-2014

society. (Mairesse and Desvallées, 2010: 30)

I continue to be somewhat critical of Mairesse, because of the one-sided character he attributes to the communication of museum collections, but I do like the fact that he stresses the transmission function, now mainly performed using Information Technology.

Information Technology[16] is universally defined by the Information Technology Association of America (ITAA) as "*the study, design, development, implementation, support or management of computer-based information systems, particularly software application and computer hardware*" (Rajaraman, 2013: 6). Here the communication aim of museums is stressed because technology is understood as an instrument.

I also intend to focus on the definition of new media, restricting the field of what used to be called new technologies, and is now considered emerging technology, employed by museums to communicate and enhance museum visits; also because the idea of museums and virtual museums as media is an important theme in my thesis. Lev Manovich gave this definition of new media, defining them as bearers of:

- numerical representation (digital frame, mathematical description, ease of manipulation);
- modularity (pixel, polygons, fonts, script, Web pages...);
- automation (automatic layout creation, de-noising, colour correction as in videogames);
- variability (ease of production of different versions, web pages from database);
- transcoding (from computing to culture, the world as computer 'model',

[16] http://en.wikipedia.org/w/index.php?title=Information_technology&oldid=538147062. Retrieved on 01-06-2014

influences of other media in interfaces, in functions, giving birth to a new computer culture).

Manovich approached museum studies, but only from the perspective of the power of databases, defined as a 'structured collection of data' (Manovich in Parry, 2010: 64), that can be used narratively, even if 'database' and 'narrative' are opposites. For Manovich (in Parry, 2010: 68-70) databases have become the centre of creative processes in the computer age because they support the narrative pattern.

Yehuda E. Kalay endorses the principles of Manovich, because in her opinion, in the heritage field,

> *the ability to represent environments and artefacts in digital form makes it possible to manipulate the information in both spatial and temporal ways, (…) [it] endows this new form of cultural heritage re-presentation with abilities (i.e. Affordances) that older forms of re-presentation could never achieve, and with new interpretations* (Kalay in Kalay, Kvan and Affleck, 2008: 3)

However using Manovich can be hazardous because in another work he uses the definition given in 'The Language of New Media': "*new media are the cultural objects which use digital computer technology for distribution and exhibition*" (Manovich, 2002; 9).

This definition would be perfect to define virtual museums as new media ("*virtual museums are the cultural object which use digital computer technology for distribution and exhibition*"); however it also introduces the paradox of a medium (virtual museums) that uses other media (Internet, cell phones) in order to communicate. And for this reason I prefer the work of Bolter and Grusin (2000) as more appropriate and advanced than that of Manovich. I completely agree with remediation theory,

> *Defined by Paul Levenson as the 'anthropotropic' process by which new media technologies improve upon or remedy prior technologies. We define the term differently, using it to mean the formal logic by which new media refashion prior media forms. Along with immediacy and hypermediacy, remediation is one of the three traits of our genealogy of new media.* (Bolter and Grusin, 2000: 273)

Bolter and Grusin do not define new media, but give a definition of the medium as the object of a *mediation* and provide the definition of transparent media and hypermedia. At the end of this research I will use their definition of virtual reality as the most transparent medium of all in my presentation of two main examples of the *Genus Bononiae Museum*'s Virtual Theatre and Augmented Reality experiments, instrumental in the definition of the virtual museum as medium.

1.6 Different kinds of emerging technologies to communicate heritage

My approach to this research, as I have stated before, also comes from the observation of the state of the art in the application of emerging technologies in the heritage field and discussion and practice in the community of museum professionals. Ever since the AVICOM International Meeting in 1991 (Tonon, Santin and Santolin 1993), digital technologies have been observed with great interest and enthusiasm by the community of museum professionals.

Taking a distance from the approaches taken by computer science and social and cultural studies, the passion felt by the professional community of museologists for the new means for communicating heritage lead them to define virtual museums as 3D reconstructions, approaching CD-ROM, digital museum guides, off and on-line digital archives, DVD, image galleries (2D) as a single, whole object with each discrete part taken at the same level (Acidini and Cappellini, 2008; Appartenenza, Fotis, Kostas and

Styliani, 2009)[17]. The situation was the same for experiments in augmented reality, mixed reality, and the use of social networks.

Ann Mintz (Mintz and Thomas, 1998: 20) describes why the age of information raises interesting issues in museology. In her opinion this occurs because museum professionals are "*Knowledge workers engaged in the creation and transfer of information*", this information is not simple data, but a real object, and it is here where she finds the paradox in the relationship between museums and computers; museums are so focussed on reality that enhancing the 'virtual', the information media field can really enhance visitor experience and the process of information transfer. This is what is interesting for museum professionals, much more so than the technological medium through which the visitor experience is enhanced. The use of information technology in museums has a quantitative and qualitative dimension: quantitative, because computer technology can offer visitors control over the amount of textual information they 'have' to read during a visit that may also be a social activity, or, on the contrary, the amount of information that visitors can access during their visit can be increased; qualitative, because computers can expand the contexts for more conventional exhibitions exponentially (Mintz and Thomas, 1998: 23).

Museum professionals, approaching the concept of the 'virtual museum', consider all communication technology that can enhance the visitors' experience either in the

[17] "*Emerging technologies, such as VR, AR and Web3D are widely used to create virtual museum exhibitions both in a museum environment through informative kiosks and on the World Wide Web. This paper peer-reviews the field, and while it explores the various kinds of virtual museums in existence, it discusses the advantages and limitation involved with a presentation of old and new methods and of the tools used for their creation*".

museum itself or from their desks (or couches) at the same level, differentiating between the technological medium used and stating the variety of different cases that the virtual museum can present. Therefore, given that this thesis has the aim of mapping the phenomenon of virtual museums from the point of view of, and for use by museum professionals, I intend to map out the complexity of the different cases that have been defined as virtual museums, making specifications for the different categories of cases I find.

Michael H. Robinson, for example, refers to 'multimedia presentations' including "*all the forms of interconnected multisensory presentations including visual, auditory, tactile, kinaesthetic, and olfactory experiences, whenever developing through mechanical or electronic devices or by experiences of living organisms*" (Mintz and Thomas, 1998: 38), tracing an history of *interactive* or *immersive* exhibitions, arriving at digital technologies, arguing that real interaction will survive any form of "*virtual reality,* or *non-natural multimedia or multisensory reality*" (Mintz and Thomas, 1998: 52-53).

Given the definitions above, emerging technologies have been used in different declinations over the years in order to communicate heritage, with different aims and degrees of effectiveness in the results. For me it is important to focus yet again on the definition of museums, and what makes a museum different from a private collection. The museum itself is a public subject, in clear opposition to the private aim of the collection. The museum collects and organizes objects for society as a whole. It is a permanent institution, a public service with a public aim, subsidised in all of its functions. This public aim influences the meaning of the object exhibited in the museum; the universal accessibility of objects in museums gives a different point of

view to the emerging technologies used by the museum to communicate heritage. This is the reason why in the following pages, and particularly in Chapter 3, I will consider emerging technologies in relation to certain qualities that can be present to a greater or lesser extent, providing these experiments with a different impact in public experience, considering the aims and objectives that the museum (undertaking the experiment) wished to attain with their projects.

On tracing the history of how museums tried to use emerging technologies, the most important examples can be found at the ICHIM conference, the FIAMP awards, and the UBICOM, CHI and TEI conferences. There are some mentions on applications of technology in museums before 1991 (Jones-Garmil, 1995: 1-7) but these applications were not relevant for the communication of heritage and enhancing visits, concerning video-projection and exhibits, also mentioned in Chapter 2 (1967 Parker's installation at Museum of the City of New York). It is interesting to note that Katherine Jones-Garmil mentions audio-visual analogical exhibition techniques back in 1970 (even if the Parker exhibit was in 1967), mentioning 'analog videodisk'. After all she herself focusses on 'museum computer networks' and on the use of computer technology.

The ICHIM conference had its first edition in 1991, and it is important to note that AVICOM also had its first conference in 1991, held by the former president of AVICOM Marco Tonon. In the first and following editions of the ICHIM conference there are mentions of the use of hypermedia in museums, stating the interests of the community of museologists in holding experiments in this field. What is relevant here is the recurrence of the term 'hypertext', from the Vannevar Bush document, 'As we may think' (Bush, 1945), when after the Second World War he imagined the Memex, a

prototypical device designed to store the world's books, records, and communications on microfilm, to extend human memory, or as Vannevar Bush explained, "*the speed of action, the intricacy of trails, the detail of mental pictures, is awe-inspiring beyond all else in nature*" (Bush, 1945). The work of Bush was followed by many other researchers such as Douglas Engelbart in 1965 with his essay on 'A Conceptual Framework for the Augmentation of Man's Intellect' (Engelbart, 1965), and Ted Nelson, who started experimentation with hypertexts (Wolf, 1965) (followed by the experiments of George Landow, where what we currently know about interactivity was born, thanks to software such as Hypercard (1987)[18].

The use of hypermediality in museums was argued at first by the previously quoted MacDonald and Alsford where they note that

> *it is desirable to employ technologies capable of integrated information delivery, regardless of the format of information (audio, video, text, etc.). This does not refer exclusively to computerized technologies; it must be remembered that our everyday living environment is the most powerful 'technology' of multimedia information delivery* (Alsford and MacDonald, 1991: 308)

using the so called 'new electronic highways' (Gibson, 1995), but also visual media, "'*take-out' information products must be available. This would include TV audio and video cassettes, teleconferences, digital data databases, laser discs and realia*" (Alsford and MacDonald, 1991: 309) or also mediateques, such as the Canadian Museum of Civilization (Alsford, MacDonald and Phillips, 1989: 47).

Huhtamo (in Parry, 2010) traces an history of the virtual museum starting from the 1991 project of 'The museum inside the telephone network', Apple computer 'Virtual museum' presented at Siggraph 1992, and CD-ROMs such as the aforementioned Louvre and Hermitage CD-ROM. Bearman in the aforementioned paper from 1992

[18] http://macgui.com/usenet/?group=14&id=4827. Retrieved on 01-06-2014

traces a history of multimedia in museum exhibitions starting from the Myron Kruger projects in 1976, covering videodisk projects and describing the contemporaneity of the year of publication of his paper (Bearman in Buckland and Stone, 1992: 122-129).

However, seeing as this thesis is aimed at museum professionals, documenting the thoughts of this community about technology, for me Ruth Perlin's words on this issue are important:

> *What do we mean when we speak of technology or 'the new technologies'? In general parlance, we mean the merging of a number of communication media - sound, text, and visual elements (still and moving images, photography) - into a composite medium generally referred as multimedia.* (Perlin in Mintz and Thomas, 1995: 74)

It is a fact that museum professionals prefer to refer to the role of technology in communicating heritage, rather than definitions relating to Computer Science.

Far from tracing a historical overview of all the different pathways taken by museums in order to communicate heritage and enhance visitor experiences, it is important to compare these initial intentions with data from the AVICOM archives for the FIAMP prize. In my research it is important to trace the activity of this award, as a benchmark for what museums can do with new technology.

Another researcher applied the award's categorization to define multimedia in the field of digital art for the use of contemporary art museum curators: Beryl Graham defined 5 sets of categories in digital art, as can be seen in the table below (Graham, in Cameron and Kenderdin, 2007: 99).

Multimediale Award Competition (pre-2004)	Prix Ars Electronica (2004)	Frieling and Daniels CD-ROM: *Media Art Interaction* (2000)	Christiane Paul: *Digital Art book* (2003)	Steve Dietz: article (1999)
Image Interaction Software	Digital communities Computer animation/Visual effects Digital music Interactive art Net vision	Users can search using three fields: *1. Medium/Context* Keywords include: Public art Multimedia Stage Film Installation Environment Internet *2. Themes/Content* Keywords include: East/West Feminism Closed Circuit GDR *3. Dates*	*Digital Technologies as a Tool*: Digital imaging; photography and print; sculpture *Digital Technologies as a Medium*: Installation; film, video and animation; Internet art and nomadic networks; software art; virtual reality...; sound and music *Themes in Digital Art*: Artificial Life; Artificial Intelligence...; telepresence...; body and identity; databases...; beyond the book; gaming; tactical media, activism and hacktivism; technologies of the future	Interactivity Connectivity Computability

Table 1: Five Sets of Categories of Digital Art

AVICOM was born in 1991, but the first edition of the FIAMP prize did not take place until 1996. Before 1996 there were meetings in which the implications of the use of audio-visual technologies were discussed (1991)[19], but it was not until 1992 that the committee opened up to the use of so called 'nouvelles technologies de l'audiovisuel'.

[19] http://archives.icom.museum/publications/avicom.html. Retrieved on 01-06-2014

The FIAMP awards were established in 1996, the categories covered were:

a. CD-ROM

b. Audio-visual (divided into thematic categories)

In 1993:

a. CD-ROM

b. Websites

In 1994

a. CD-ROM

b. Websites

c. Audio-visual (not divided into thematic categories)

The situation of the categories awarded was increased only in 2004, with:

a. Audio-visuals (divided into short, medium, long)

b. CD-ROM

c. ‘Generalist’ websites

d. Virtual exhibitions

In 2006 the categories were:

a. Interactive stations and exhibits

b. CD-ROM and DVD-ROM

c. Audio-visuals (short, medium, long)

d. Websites (‘simple’ websites and interactive exhibitions on the web)

Since then the situation has been substantially the same (the websites category has been known as WebArt) since 2009, when thing changed substantially. The categories became:

a. Audio-visuals (short, medium, long)
b. Multimedia mobile applications, 'WebArt', interactive stations and exhibits, CD-ROM.

Since 2012, the categories are:

a. New museology
b. 'Generalist' websites
c. Exhibition and dossier websites
d. Audio-visuals (short, medium, long)
e. Multimedia (localized project, mobile app and digital exhibition on touch screen)

These categories, (ignoring audio-visuals as stated before), are relevant in their reality datum aspect, however in the AVICOM archives they have been defined as 'products', awarded for their ability to enhance museum experience and communicate heritage. In the following subsections I will focus on the emerging technologies used in these products, in addition to a more general overview of these 22 years of experimentation.

1.6.1 CD/DVD-ROM technology (Read-Only memories technology)

The CD-ROM section is strongly linked to the following web technology section. The aim is to provide information about the museum, but above all materials (hypertext,

images or videos) in a self-standing application employed in museums using various formats. There are mentions in the 1993 ICHIM awards about

> *Moscow's Kremlin Museum, specifically a computer film created and published by COMINFO known as 'Trip around the Moscow Kremlin'. INTERSOFT published two computer films, 'Troizko-Sergieva Lavra' and 'Trip around the Hermitage'. Both of them were floppy disks. ARAGASTB from Armenia published two computer films: 'Hyper guide to Armenia' and 'Virtual museum'. The MM shell uses textual essays, images and audio files to guide the viewer through a magnificent world of visual audio treasures. A thematic series of various aspects of Armenian art have been developed.* (Noll in Lees, 1993)

The boundary in the above example between passive vision and interaction is clear; museums oriented themselves in experimenting hypertextual capability for users to have a personal approach to what was stored in the support.

Award winning releases such as the Louvre (1994, winning the Golden Award for Art and Culture at MILIA, 1995; the Moebius winning public award in 1994; the 'Best Reference Title' at MIM 1995 Montreal; Winning award 'Best Multimedia Product of the Year' at MIM 1995, Montreal; Finalist of the ZIFF-DAVIS European Awards, 'Best Consumer Product'), National Gallery of London (Microsoft's Art Gallery, 1994), and Santo Stefano in Bologna (2000). Museum CD-ROMs have the aim to allow visitors to examine the exhibits, browse through albums of images, use paratextual information such as audio-guides, audio commentary (including music), and hyperlinks that facilitate browsing. The educational aim is strongly present, as is the potential to create a catalogue with interactivity, and to let the public visit the museum in a different way, a visit to a virtual museum made by museologists themselves.

In evaluating these efforts with general usability criteria, in the example of Microsoft Art Gallery, a study revealed for example the

> *lack of consistency in interacting with apparently similar features in different nodes (that) creates problems with predictability, and therefore readability.*

> *Readers must try several options before getting what they want, if they get it at all and Lack of self-sufficiency.* (Garzotto, Mainetti, Paolini 1995: 84)

This, as for most other similar products, can be avoided with user-oriented design, instead of a more "*elegant layout design*" (Garzotto, Mainetti, Paolini 1995: 85) in many cases.

1.6.2 Web technologies

This web technology section is strongly linked to the previous CD-ROM section.

As I stated before, the use of the web increased with the increasing of the global broadband network, and national web infrastructures. This meant that the majority of the contents assembled for ROM supports came into the web with certain difficulties as a consequence of the software technology employed (not all CD/DVD-ROM or Floppy Disks were produced using web-compliant technology), and also due to the politics of the museum itself. A ROM memory is close to the idea of a catalogue, being the *realia* of the museum, allowing the organization to make financial advantage from the efforts made to create the hypertext, while web access to contents is potentially free. Another issue was copyright on contents (objects, painting, paratextual information): it is not true that all the objects in a museum can be transmitted via web.

For years, as in the related CD-ROM, the Louvre website was one of the first and most interesting cases of a museum on the web. As I stated before, even if Internet is more than 40 years old, web technology is in constant evolution. In order to make a brief evaluation of first web museum experience and its posterior evolution (to be examined in depth in Chapter 3) I would like to refer to a critique from the late nineties made by an important observer of museum websites:

> *Modelled on the table of contents of a magazine or the brochure for a curated exhibition, such a site contains an exclusive selection of artworks that one or more experts have deemed to be instructive to the general public. This approach is familiar. It's convenient. And it's completely at odds with the social and technological underpinnings of the Internet. To come to terms with a digital culture, an interface to art on the Web cannot merely ape museum brochures and magazines, which rely for their power on self-containment, exclusivity, and instruction by experts. Engaging the Internet on its own terms will require an approach that is radically distributed-one that may threaten to spill beyond the appointed containers of traditional criticism.* (Ippolito, 1997: 68)

Those words make a lot of sense if we consider the year that John Ippolito wrote them, 1997, and the suggestions that he gives in the following pages. Comparing two popular websites from the time when he was writing, Firefly and Tierra, (Ippolito, 1997: 72) he states that the success of these experiences, in spite of art and museum websites, is encouraging conversations among their users. At that time art and museum websites had this kind

> *of dialogue about art, whether it occurs at a CAA panel or in a car on the way to work, is essential to the propagation and maintenance of culture as we know it. Without such a social dimension, the prosthetic ego could merely refine individual users' areas of interest without exposing them to unfamiliar styles or methods.* (Ippolito, 1997: 73)

At this time there were many attempts to create a method for the evaluation of museum websites (MiLE, Milano-Lugano Evaluation method, in Di Blas et al., 2002), but in my opinion museum websites can be structured in so many ways, with so many individual different aims and uses by the visitors that I will try to categorize in Chapter 4, concentrating on the dimension of virtual museum websites.

The single most important technological renovation of the Internet is the IPv6 protocol[20]: this implementation is also significant as a support due to the exponential growth of internet server (traffic and users), that also significantly increased speed of the *electric highways* that allowed museum websites to be richer in contents and user

[20] http://www.ietf.org/rfc/rfc2460.txt the document is of 1998, IPv6 was applied in 2012. Retrieved on 01-06-2014

interactions. However it was the so called web 2.0 (O'Reilly, 2005), after the failure of Netscape and the old style Internet economy that opened the door to the vision of John Ippolito.

1.6.3 Reconstruction technologies

Reconstruction technologies were used in museums for various purposes. A boundary should be set between the reconstructions in use for archaeology sites or for research in the heritage field; here we only focusing on the reconstruction technologies employed in museums. Experiments with 3D models of museums included the reconstruction of models of the brick and mortar museum with several additional features.

The museum reconstruction can be a stand-alone model with no uses at all apart from being viewed and browsed, or an environment in which the user can browse 3D reconstructions of museum objects. Some examples can be recalled, as in Miller (Miller et al., 1992), Ciabatti (Ciabatti, Cignogni, Montani and Scopigno, 1998), in Bonfigli and Guidazzoli (1999), Bocchi (2004) as well as the experiments of Angelo Panebarco from 2005[21] and Francesco Antinucci of CNR (Antinucci, 2004). Some examples will be examined in the categorization chapter, regarding the Virtual Museum of Iraq, that presents a totally imaginary 3D environment populated with 3D models of objects and information. Other experiments in this field include more interactive environments, such as the metaverse Second Life, in which you could find reconstructions of cities: Mantua, Palazzo Te, Nuvolari Museum, Bibiena Theatre, Sant'Andrea Basel in 2007, and much more. The benefits of 3D reconstruction for museums can be recalled in Antinucci (2004), for giving an additional study instrument, or for marketing strategy (Gerosa,

[21] http://www.internetculturale.it/opencms/opencms/it/pagine/percorsi/pagina_812.html. Retrieved on 01-06-2014

2008; Carlone and Grella, 2011), or for permitting visits to sites that are closed to the public (such as the Lascaux Virtual Museum). In some cases making 3D reconstructions in the museum context can provide a sort of 'mirror' of the real organization of information in the museum, making a digital replica of the 'physical browsable space' of the museum; in other cases, according to John Ippolito (1997), they can be an instrument for something else, permitting interactions between digital visitors.

1.6.4 Augmentation technology versus reconstruction technology

Weiser introduced the area of ubiquitous computing (ubicomp) and put forth a vision of people and environments augmented with computational resources that provide information and services when and where desired (Weiser, 1991). This concept is significant in examining museums' experimentation in the field of augmented reality. I wish to relate to the theory of reality-virtuality continuum as defined by Milgram (Milgram; Takemura, Utsumi and Kishino, 1994; Milovidov, 2013) assuming a continuity between reality and virtuality, that can combine in a scheme where reality or virtuality are dominant upon the other. In this scheme there can be examples of total virtual environments such as 3D reconstructions, and augmented reality layers browsable by a device that combines information in a real environment.

Whereas reconstruction technologies are commonly stand-alone applications (most V-Must experiments as well as Second Life or metaverse experiments) bring virtual visitors from their desks or couches inside the reconstruction; augmentation technologies bring the interaction between visitors and digital contents inside the brick and mortar museum, most commonly using the visitor's personal device (such as a smartphone), or less commonly one provided by the museum.

The differences are great, taking into account the difference between the technology used: for 3D reconstructions, for mapping and rebuilding a model of the museum or of the cultural asset, and defining an environment that can bring it to the visitor in a browsable system. For augmentation technology, 3D reconstructions exist, but they can only be browsed within the area of the museum, most commonly by a hand-held device (smartphone or device provided for visitors by the museum[22]). In both the cases there are 3D reconstructions of the museum artefacts, but they can only be browsed in the context of the museum: in its location, and contextualized in specific 'AR tours' (or games[23]).

The main difference upon which I want to focus is the *place* of interaction. As Ciolfi wrote,

> *On the theoretical side, it is the individual, social, cultural and physical aspects of human experience of space and place that have to be studied and understood in designing ubiquitous technology. This is necessary in order to shift the focus from the development of the system infrastructure on one side, and the analysis of users' activities on the other, to a more complex view of the users' experience as localised, inextricably linked with its physical surroundings by means of individual, social, cultural and structural/functional relationships between the two.* (Ciolfi, 2004: 5)

The space of the interaction, when the interaction occurs between groups or individuals, in an exhibition, becomes the *place* of the interaction, and in the main case of an exhibition or an experience in the heritage field, interaction itself in the place where visitors *reconfigure* the exhibition (Ciolfi, 2004: 7) and go further than what is programmed, catalogued, digitally reconstructed, creating a place of dialogue between individuals, and between visitors and the cultural institute.

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[22] Cluny Augmented Reality tour, ENSAM – On-Situ, 'Dispositif de réalité augmentée pour l'abbaye de Cluny: Ray-on' http://www.on-situ.com/, and Kärner Landesmuseum in Klagenfurt/Carinthia, http://studierstube.icg.tugraz.at/handheld_ar/marq.php. Retrieved on 01-06-2014

[23] Gamification with augmented reality is very common, thinking also at the 'ultimate dinosaur' exhibition http://www.cincymuseum.org/exhibits/ultimate-dinosaurs/app. Retrieved on 01-06-2014

1.6.5 Hybrid technologies versus wholly digital technologies

Coming back to the thoughts of Ann Mintz (Mintz and Thomas, 1998: 20), mentioned in the previous paragraphs, the focus is now on the interfaces, and how a 'transparent' interface (Norman, 1998) can be fruitful in the project and in the experimentation of interactive exhibitions and virtual museums.

I recognize the significant difference between visiting a brick and mortar gallery where screens, movies and additional digital contents can be activated by the visitor (as in the IX Centenary Museum[24], or in the museum created by Studio Azzurro), and browsing a digital gallery using the computer/browser interface, Second Life platform-based exhibitions, or a virtual exhibition such as those of Internet Culturale[25]. Given the studies of Anceschi (1992) and Norman (1988 and 1998), the relationship that is created between the user and the contents by the interface is complicated. The efforts of interface designers are focused on creating more and more transparent interfaces, building the *place* of interaction (Anceschi, 1992: 40, quoting Thullermann and Calabrese). Visiting a museum involves the fact of physically going to the museum, entering, and being in (a variable grade of) interaction with other visitors (companions, guides, other visitors occupying the same physical space). In a virtual museum browsed through the interface of a computer or other device, that physical co-presence in absent: it may be possible to come across other users visiting the same virtual exhibit and to build a relationship with them (using the tools provided by the exhibit or by social networks); however this interaction with other visitors and also with the artefacts being browed is wholly mediated by the interface. The *osmotic membrane* that separates the object from the user (Anceschi, 1992) may be the interface of the computer, using

[24] I am referencing some examples I will study in this work below.
[25] That will be better discussed further in this work.

wholly digital technology, permitting a more direct 'study' and relation with the digital representation of the object: for a 3D reconstruction the object can be rotated for example, or the image of the object can be enlarged, such as in the invisible details of the gigapixel artwork of *Google Art Project* II generation). In a museum the object is 'untouchable', and the visitor is physically separated from it (or it is strictly prohibited to touch), and no operation on the object can be conducted. However in the museum, even if hybrid technology is used, the visitor is in the same physical *place* as the object (Ciolfi, 2004). This implies that the visitor can use some kind of haptic or kinetic *interface* (I use the example of Studio Azzurro museums or exhibits such as 'Fare gli italiani' or 'Museo della Resistenza'). However the visitor in the same *place* as the object must also activate a proxemic implication: they can be near the *intimate space* of the object, defined by Hall (1966) at 0.45 meters (the 'arm's length' distance between a visitor and a painting, for instance), and in a spatial relationship with other visitors. This type of relationship that implies being physically in the same *place* as an object and other visitors cannot be recreated using a computer interface, as will be better explained in the following section.

1.7 The importance of wonder

Most museum professionals come from an educational background in the humanities. An important part of this research is devoted to making the concept of the virtual museum more comprehensible to the community of museum professionals by focussing more on the aims and the functions of museums, than on technological debates.

Even without making reference to the whole history of the definition of museums and

limiting ourselves to the official ICOM definition, it is important to refer to Italian museology and to two of the most important museologists in this trend: Daniele Jalla and Gianni Pinna. Pinna has traced a brief but brilliant history and taxonomy of museums. Like any other means of communication, museums are places where information is manipulated; this characteristic is exercised to a greater or lesser extent in relation to the structure of society within which it operates; control over museums is the object of some political friction between different factions aspiring to attain a dominant position in society. Museums are therefore political structures, whose power lies in their role as guardians of the heritage considered to be the historical memory of society, and whose strength is expressed in the creation of the symbolic value of this heritage, namely the creation of a culture, and in the dissemination of this culture in society (Pinna and Sutera, 2000: 1).

The idea that museums are places where information is manipulated is of great importance for the definition of museums, and by extension for the concept of virtual museums. Pinna has established a continuum between virtual museums and tangible museums. Museums carry out cultural diffusion through public exhibitions, which, thanks to a wide variety of different media can easily be directed to a pre-determined objective by those who control the museum (Pinna and Sutera, 2000: 1).

For Pinna the media have the role of cultural diffusion for the public and are the means through which museums' main targets are reached. For Pinna, museum exhibitions express the relationship between museums and visitors; this relationship can be set out in three different 'philosophies'.

There are at least three underlying philosophies for museum exhibitions, corresponding to three different interpretations of the relationship established between the object and the visitor; this relationship is simply the intellectual contact established between the museum as a whole and its audience. These philosophies use three different ways of looking at or using the objects on display in the museum and each of them has its own particular value for the purpose of controlling the cultural dissemination operated by the museum. We could call the first of these philosophies 'the museology of wonder', the second 'rational museology' and the third 'evocative or resonant museology'. 'The museology of wonder' can be traced back to cabinets of curiosities and collections of artificialia and naturalia, displayed with the aim of amazing visitors. The purpose here being to show off the strangest, most unusual or monstrous forms of nature, as well as beautiful man-made objects from the past and present. A type of museology that while recalling Kunst and Wunderkammern is now the dominant philosophy in art galleries and, in art museums in general. Franco Albini, Carlo Scarpa and architects from the BBPR studio; Banfi, Belgiojoso, Peressutti and Rogers were the torchbearers of this philosophy in the 1950s and 60s (Pinna and Sutera, 2000: 1).

It is important to note that these 3 different philosophies of museology are not consequential or temporally consequent on one another; rather it is possible to make out examples of 'wonder-museology', 'rational-museology' and 'evocative-museology'.

Following Pinna, Daniele Jalla (in Gennaro, 2007) stresses the preponderance of 'wonder-Museology' over the others, citing Bettelheim (1990) who went back to Francis Bacon "*Wonder is the seed of knowledge*" (1605).

If the use of the singular is entirely legitimate on talking about the museum in general as an abstract figure, deliberately deprived of the distinctive traits that make each museum

a reality to some extent in its own right, the use of the plural becomes an obligation if, starting from the examination of these traits, the obvious conclusion is reached that not only do museums belong to different genres and are divided into species, classes and families, but that the identity of each one is primarily determined by the character of diversity and singularity that distinguish it.

The difference and singularity of each museum would be a good point to start to ascertain its goals and to locate its functions, if only to avoid altering or damaging its nature and potential. It is however impossible to avoid taking these concepts into account if the prospective is also that of returning the ability to astonish and inspire wonder to each museum, regardless of its size, fame, the wealth of its collections and its means (Jalla in Gennaro, 2007: 15).

Jalla bestows museums with the role to amaze and to cause wonder in visitors, but this is not their only role: he does not think that the wonder "*of the museum could be the end*", because this would make the museum a different type of institution, more like a sideshow at Luna Park than anything else, but it could certainly be a means. Not necessarily the only one, but one of many means for communication. As a product of a gap and a difference, present in things or as a product of display, but always with the condition of the visitor's eyes and head being able to perceive them (Jalla in Gennaro, 2007: 15).

Here Jalla refers to Peter Greenblatt who in his famous essay entitled 'Resonance and Wonder' (Greenblatt, 1990: 42) identifies what he defines as "*two distinct models for the exhibition of works of art*" calling them resonance and wonder, resonance meaning the power endowed in objects on display to cross their formal limits and assume a broader dimension, evoking in those looking, the complex and dynamic cultural forces

from which it emerged and which can be considered by a representative sample by observers. and considering wonder the power held by the displayed object to stop the observer in his or her steps, communicating a sense of uniqueness arousing intense attention.

Jalla refers to these two definitions perfect in their clarity and perspicuity, and yet he is critical about the fact that reference can be made, as Greenblatt does

> *exclusively or primarily to things in themselves, neither to devices put in place to communicate; the same object may arouse wonder or resonance, depending on the observer, it also possible that the two effects may coexist in the same person, depending not so much on the observed object, but on the relationship established, taking the visitor's baggage of culture, ideas and values as a starting point, as well as the means used for communication.* (Jalla in Gennaro, 2007: 15)

If it is true that the museum is its audience, much depends both on this and on the relationship that the museum is able to establish, in terms of wonder and resonance between things, and visitors, through communication strategies that are capable, to the greatest extent possible, of making the crossing from wonder to resonance.

The great psychoanalyst, Bruno Bettelheim, warns, quoting Francis Bacon's maxim that "*Wonder is the seed whence knowledge is born*" warning that this statement is not reversible: rational knowledge cannot generate wonder, which is an emotion (Bettelheim, 1990: 192). This statement is controversial because it could be argued that there are also cases that contradict it. It is still true, however, and not only for the children that Bettelheim's essay deals with (its original title was Children and Museums), the conclusion to which he comes by stating that the biggest value that museums may have irrespective of their content is that of stimulating and more importantly, fascinating the imagination; awakening curiosity in such a way as to drive us to penetrate ever more deeply into the meaning of objects, providing the chance to

see, each in their own time and pace, things that are out of reach and, above all, to communicate a sense of reverence for the wonders of the world. Because in a world that was not full of wonder, it would not be worth growing and living (Bettelheim, 1990: 192).

However smartness can also drive museums to places where they really can surprise and bring on real, strong emotions. Stefano Mirti, former Dean of the NABA Design School in Milan describes very well what a museum must be

> *For my way of thinking, the museum should have thousands of these short circuits. From 1 to 10, I left annoyed 2, maybe 3. Here you are.*
>
> *My ideal museum is a place I leave annoyed. Hopping mad. Do you want to make it emotional? Perfect, but make it for real. This made the sling, the 200 great artists all honoured in predetermined deadening order. Emotions almost zero. Forget a couple of them on purpose (so there are only 198 left) and then see what happens.*
>
> *I dream of a museum that slaps you around and then kisses you lasciviously, hiring out leopard skin handcuffs at the ticket office. Let's go all the way: to say that the museum is alive because it's got a Fabio Novembre table seems a bit simplistic. I'm sure if Fabio put his mind to it he could come up with some intriguing and fascinating trinkets ...* (Mirti and Novembre, 2008)

This dimension of 'wonder' applied to museum and virtual museums, makes the question of how and why museum professionals deal with the applications of technology in the communication of heritage more easily comprehensible. It is not only a question of being "up-to-date" and applying state-of-the-art technology for attracting new visitors and increasing the number of young visitors, for example. It is also a fact that by applying new technologies in order to communicate heritage, museum professionals can better accomplish their mission to communicate heritage in a functional but also pleasant and stunning way. In the next section I will try to explain what the term 'virtual' means as in the expression 'virtual museum' and specify the use of 'tangible' and 'intangible', as applied in this field of study.

1.8 'Virtual' and 'Real', 'Tangible' and 'Intangible': a clarification of terminology

I agree with the ideas of Capucci (1993: 95), current Director of Studies at the node of the Planetary Collegium where this research was born, that the term virtual reality comes from an unfortunate use of terminology. Capucci states that if we understand 'virtual' as 'not real', then a theatre performance, a fresco, a movie, a novel or video game, all creating and offering an invented world in their own way, would have to be considered as 'virtual realities'. For Capucci the entire symbolic universe of representation, including dreams, is virtual.

To quote other thinkers, Nicholas Negroponte (1993) confirms that the success of the term 'virtual reality' derives from the semantic nature of its idiom as an oxymoron. Thomas Maldonado (1993) refers to a sort of 'dematerialization' of reality in its complexity, where more and more services, activities, relationships travel on the binaries of the immaterial. for Maldonado, this immateriality of the world would seem to be best exemplified in virtual environments and worlds: the immateriality of the subject that finds the incorporeity of the avatar its highest expression. These processes do not mean that the tangible world is vanishing but rather that humanity and world 'travel' between different dimensions and that humanity is not limited to a material and tangible physicality. This situation allows Maldonado to reconsider the term 'virtual reality' as an 'other' reality, not less real then reality itself: a different 'state' in which reality presents itself as the dimension of the 'possible' and the 'becoming' of reality.

So it became clear to me that as the term 'virtual reality' is an oxymoron, in the same way that the term 'virtual museum' is affected by the same inner basic contradiction,

because, as I explained in Chapter 3, certain virtual museums are as real as the 'real' ones. I therefore decided to use the term 'tangible' and 'intangible' museums to distinguish between brick and mortar museums and those that depend on immaterial digital support. However I also continued to use the term 'virtual museum', because it is the most commonly used by the academic and professional communities in defining the phenomena object of this research.

Regarding heritage and the concepts of the tangible and intangible, it is important to clarify two points that will be covered further in my definition of the virtual museum. The first is UNESCO's definition of intangible heritage. UNESCO after a peer-review taken in 2001 defined intangible heritage as "*the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage*"[26].

This definition stresses the fact that museums have to preserve, archive and communicate tangible but also intangible 'objects', that are expressions of the planet's culture.

On the other hand, as a second point, I would like to report the discussions within ICOM on definitions of the museum, the virtual museum and intangible heritage.

Paul F. Donahue, head of CIMUSET, the International Committee for Museums and Collections of Science and Technology, states that ICOM's Code of Ethics[27] does not give a strict definition of collection, but gives some *directions* to follow. Donahue goes on to say that there are many exceptions to ICOM's definition of the museum and to the

[26] http://www.unesco.org/services/documentation/archives/multimedia/?id_page=13&PHPSESSID=743f303f0b2452205c4a672fde9310bc. Retrieved on 01-06-2014

[27] http://icom.museum/fileadmin/user_upload/pdf/Codes/code_ethics2013_eng.pdf. Retrieved on 01-06-2014

traditional concept of a museum as a collecting institution. Examples that Donahue reports are one-object museums, such as a ship museum or a house museum with a plethora of culturally associated objects, the hobby museum that puts its members' models on exhibition but does not concern itself with acquisition, preservation or research, the art museum that does not appear to have acquired a permanent collection[28], and the virtual museum with virtual objects, in conjunction with the science centre or children's museum with no collection.

Donahue's definition excludes institutions which do not acquire, conserve or research material evidence but which may function in the service of society and its development, and communicate and exhibit, for purposes of study, education and enjoyment, material (and immaterial) evidence of people and their environment. For Donahue ICOM's definition of the museum may cause problems or unfair advantages when an individual or institution has to deal with such mundane matters as qualifying for insurance, grants, bursaries, membership criteria, academic training, etc.

In keeping with the practice, established in 1974, of qualifying museums, Donahue hopes that ICOM will become less rigid and broaden its definition to include non-collecting institutions. The question that Donahue poses is

> *Do we principally exist to collect or to inform? I believe the latter. As too exclusive a definition could result in a weaker ICOM,* ***I suggest that ICOM members strive to construct a strong inclusive vision of what constitutes a museum, focused on service to society. To this end, I suggest that the definition be rephrased in such a way that to acquire, conserve and research objects should be optional not compulsory***. (Donahue, 2004: 1)

After 2004, the discussion inside ICOM is still open, and I would like to refer to an open-glossary[29] that Italian ICOM AVICOM members have been discussing since 2011

[28] For this, see Andrew J. Pekarik's article "Museums as Symbols" in Curator 46/2, April 2003, pp.132-135.

[29] http://audiovisivi-nuove-tecnologie.wikispaces.com/Glossario. Retrieved on 01-06-2014

in the ‘Audio-visual and New Technologies ’ thematic commission. Giuliana Pascucci, was the promoter of this demand for a shared vocabulary of terms. Regarding the peer review of the taxonomy presented in Chapter 3, Giuliana Pascucci and Irene Rubino shared the demand to talk of multi-media or audio-visual museums instead of virtual museums. In recent years the expression ‘virtual museum’ seems to be confusing for museum professionals who are used to conducting experiments in the application of technology in the field of heritage because they often feel that these are ‘real’ ways to communicate heritage, instead putting the stress on the ‘potential’ acceptation of the term ‘virtual’, as is the case of the aforementioned theorists.

Elisa Giaccardi, a PhD member of the Planetary Collegium, made some interesting observations on the use of the term ‘virtual museum’ (Giaccardi, 2006: 7). She mentions that museums and cultural objects represent a complex and multifaceted reality in which ‘physical’, ‘cultural’ and ‘virtual’ interact and may acquire different functions and different degrees of importance. According to Benedetti, Elisa Giaccardi states that museums and cultural objects are ‘iridescent’. She applied the concept of ‘iridescence’ in contemporary museology, referring to the fact that the perception of cultural objects (how we ‘see’ them) is subject to change according to the different perspectives in which they can be interpreted and presented. Normally, this perception is the result of the cultural and historical interplay among the physical tangibility of the object (‘physical’), its actual interpretation (‘cultural’), and its potential interpretations and meanings (‘virtual’). Today, by means of information technologies, we can make these components interact more dynamically.

So, in my research work, in order to avoid confusion around the use of the term ‘virtual’, especially in the case of certain museums that may be defined as ‘virtual

museums', I will make frequent reference to the term 'intangible museums', as opposed to 'tangible museums'. In this differentiation I will refer to 'tangible museums' to be understood as 'brick and mortar' museums, as buildings displaying real objects directly to visitors, in opposition to 'intangible museums' on the web, or on a support requiring the use of digital technologies that can be defined as 'virtual museums' using my definition, and/or have been defined as 'virtual museums' by the museum professional or academic communities.

With these definitions, it is now easier to deal with the definitions of the virtual museum and to provide a new definition to resonate with the culture and sensibility of museum professionals, taking into consideration all known definitions of the virtual museum, in accordance with the aims of this research.

1.9 My definition of the virtual museum

In this section I will explain my definition of the virtual museum, also making reference to other significant definitions in line with my research work.

To go back to Huhtamo, who stated in 2010 that "*the notion 'virtual museum' has been evoked so often that it has lost all of its novelty value*" (Huhtamo in Parry, 2010: 121). He also attempted to recognize the origin of virtual museum further back in time then his contemporaries (Huhtamo in Parry, 2010: 123-130).

Historically, Schweibenz (1998) reports that the first definition of virtual museum comes from Geoffrey Lewis, who described the virtual museum as a collection of digitally recorded images, sound files, text documents, and other data of historical, scientific, or cultural interest that are accessed through electronic media. A virtual

museum does not house actual objects and therefore lacks the permanence and unique qualities of a museum in the institutional definition of the term (Britannica Online, Article Section, 1996).

Massimo Negri refers to one of the first recorded definitions of the virtual museum in January 1997 (later than that quoted by Lewis above), by Jamie McKenzie and published by the 'Technology & Learning Magazine'.

> *"A virtual museum is a collection of electronic artefacts and information resources – virtually anything which can be digitalized. The collection may include paintings, drawings, photographs, diagrams, recordings, video segments, newspaper articles, transcripts of interviews, numerical databases and a host of other items which may be saved on the virtual museum's file server. It may also offer pointers to great resources around the world relevant to the museum's main focus". Interestingly enough, in McKenzie's definition the Internet was not explicitly mentioned. (Negri, 2012: 12)*

Klaus Muller states that "*Of course, there is a difference between real objects displayed in an on-site museum and their virtual reproduction in an on-line environment*" (Muller in Parry, 2010: 297).

However it is important for me in this thesis to refer to and explain a functional definition of the virtual museum for the museum professionals community, not the history of the definitions of the virtual museum.

If we go in deep into Huhtamo's work, we can see that everything can be considered a virtual museum (Huhtamo in Parry, 2010). In my opinion, in opposition to what many museum professionals think, virtual museums are not museums that exist exclusively on-line. They may exist on any kind of support, including CD-ROM, 3D environments or as journeys in any of the few Virtual Theatres existing all over the globe.

The first experiments in virtual museums were simply the website of a physical

museum, or, before that, a videodisk or a CD-ROM displaying digital reproduction of artworks stored in a physical museum (Bearman, 1992). A concept of a museum 'without walls' had, however, been introduced as early as 1953 by Malraux, who imagined it being an environment for the presentation of mainly photography and art. The term 'virtual museum' was first coined by Gibbs and Tsichritzis in their article 'Virtual museums and virtual realities' (1991) referring to a museum constructed for a virtual landscape and functioning as a service rather than a location. Another early idea of the virtual museum was the VR virtual museum that was a copy of the physical museum in its architecture generally containing 2D and 3D images of items from the museum's collections. The virtual museum later evolved to refer to web sites of museums that contained different types of media (multimedia) to present information, such as images, text, sound etc. This is still partly the case, but a virtual museum is today considered to be of a greater complexity than simply different types of media-presented information on a website. Virtual museums have become a matter of not just basic information, but also of how the information is being presented to the users (Ivarsson, 2004).

There have been a great deal of technological changes and experiments since 1992 bringing on new standards, so the restrictive definition of virtual museum as 'on-line museums' is no longer acceptable.

An ICOM document anticipating certain entries from the Official Museological Dictionary could be seen as problematic for my definition.

With the development of computers and the digital world the concept of cyber museum,

often incorrectly called ‘virtual’, gradually became accepted; a notion generally defined as

> *a logically related collection of digital objects composed in a variety of media which, through its connectivity and its multi-accessible nature, lends itself to transcending traditional methods of communicating and interacting with visitors..; it has no real place or space; its objects and the related information can be disseminated all over the world.* (Schweibenz, 1998)

This definition, probably derived from the relatively recent notion of virtual computer memory, appears to be something of a misinterpretation. We must remember that ‘virtual’ is not the opposite of ‘real’, as we tend to believe too readily, but rather the opposite of ‘actual’ in its original sense of ‘now existing’. An egg is a virtual chicken; it is programmed to become a chicken and should become one if nothing gets in the way of its development. In this sense the virtual museum can be seen as all conceivable museums, or all the conceivable solutions applied to the problems posed by traditional museums. Thus the virtual museum can be defined as a

> *concept which globally identifies the problem areas of the museal field, that is to say the effects of the process of decontextualisation / recontextualisation; a collection of substitutes can be a virtual museum just as much as a computerised data base; it is the museum in its exterior theatre of operations*. (Deloche, 2001)

> *The virtual museum is the package of solutions that may be applied to museum problems, and naturally includes the cyber museum, but is not limited to it.* (Mairesse and Desvallées, 2010: 58-59)

I completely agree with Mairesse about the global misinterpretation of ‘virtual’ and ‘real’ museums, in fact I will refer in the rest of my research to virtual museums and ‘tangible’ museums, even if Mairesse includes in his definition museums made up of a collection of substitutes that may also be tangible, such as the Tactile Museo Omero in Ancona[30], designed especially for blind people with ‘tangible’ and ‘touchable’ replicas of many masterpieces.

[30] http://www.museoomero.it/main?lang=4. Retrieved on 01-06-2014

However I disagree with Mairesse's definition of 'cyber museums'. He provides no definition of 'virtual exhibitions' in the dictionary but he does identify how communication gradually became the driving force of museum operations towards the end of the 20th century. In this context the very large sums invested by museums in their websites are a significant part of the museum's communication logic. Consequences include the many digital exhibitions or cyber-exhibitions, on-line catalogues, discussion forums, and forays into social networks (Mairesse and Desvallées, 2010: 30).

In this passage Mairesse traces the role of communication in museum operations, having already stated that "*The virtual museum is the package of solutions that may be applied to museum problems*", including that of communication. These examples will also provide me with the direction for addressing my research into the taxonomy of six generations of virtual museums.

I agree with Malraux's definition, (Malraux, 1967: 75)[31] supported by Tsichritzis (Gibbs and Tsichritzis, 1991), Chen (2007) and Dietz (Dietz et al., 2003), supported by Schweibenz (1998) and Bearman (1992), of VMs as 'museums without walls', and this definition, although somewhat vague, is in line with my idea of virtual museum.

Many theorists in the field of virtual museums refer to Malraux's definition of the 'museum without walls'[32].

[31] The English version, the original document is from 1951.

[32] It is remarkable in this sense the experience of Philippe Daverio's Bbook 'Il museo immaginato'. Philippe Daverio is a very notorious art popularizer in Italy, with a famous art programme on TV, conferences and appearances in conferences; he starts from Malraux in creating the best museum he can imagine in his book, drawing the plan of an imaginary palace, and putting the most important paintings of the world, in his opinion, on the walls of the room of the imaginary palace. It is interesting that he marks, when he links to Malraux, his impression about the emerging technology of typographic reproduction, and in parallel Daverio stresses the importance of Internet and of technologies like Google Images in searching informations about the paintings in his museum for readers/virtual visitors, and also for completing his book.

Elisa Giaccardi refers to Malraux putting the stress on the *non-place* characteristic of museums and virtual museums (Giaccardi, 2006; 2) arriving to the concept of *meta-place* for virtual museums, referring also to Bertuglia and other theorists.

This concept was employed in the field of technologies and museology through the building of 3D representation of spaces. Then, interest in the conceptual framework of Malraux shifted towards the creation of a very different kind of museum.

Endorsing this shift, Bearman states that "*advocates of 'museum without walls' and 'virtual museums' see interactive multimedia as deliverance, not a delivery vehicle*" (Bearman, 1992: 130).

Antonio Battro (in Parry, 2010: 136) traces an history of the virtual museum starting from Malraux's definition, focusing on the aspects of reproduction of artworks in virtual museums, and the consequent change of meaning and use (and access) for the virtual visitor. Battro notes that the work of Malraux centres on the museum function of sharing artworks, bringing masterpieces to new life "*because they are shared*" (Battro in Parry, 2010: 139). Remembering the seminal work of Walter Benjamin 'The Work of Art in the Age of Mechanical Reproduction' (Benjamin, 1936), Malraux was impressed by the potential of "*mass reproduction techniques*", in his age, photography, now considered digital techniques of communication (Battro in Parry, 2010: 140-141). These concepts, digital reproduction and sharing ability (without referring to social networks) are the main concepts that bring Malraux's definition of the 'museum without walls' into the field of the virtual museum and new museology. Battro goes further in describing the potential of a 'bespoke' or 'portable museum' in which the visitor does

not feel the need, or even the desire, to go to the real museum or to see the real artwork (Battro in Parry, 2010: 143), browsing "o*nly virtual objects" in "only virtual museums*" (Battro in Parry, 2010: 144). "*Malraux never thought of his imaginary museum as a substitute for a real one*, and so do I, *but as a particular extension of the latter, with specific functions of artistic appreciation and historical research*" (Battro in Parry, 2010: 145).

Whit those premises, in my research work, I have defined virtual museums as museums fulfilling the following conditions:

1. they must meet the maximum amount of museological standards[33] defined for tangible museums (Ivarsson, 2004) (ICOM Statutes);
2. application of digital technology (Schweibenz, 1998).

This definition of the virtual museum is the most robust and best possible for my thesis given my premises, in order to allow museum professionals to understand virtual museums better and apply this concept in their everyday work.

This definition also comes from two different inputs that I have found useful, taking into consideration the discourse above.

The first comes from an official ICOM document that appeared in ICOM News, covering the new dignity to be held by of virtual collections in museum contexts, as compared to the 'traditional' museum that preserves, acquires and shows collection made up of real tangible objects that I quoted in the previous section (Donahue, 2004: 1). If ICOM began to consider digital collections as equivalent of their tangible ones counterparts ten years ago, this means that the ICOM standard can also apply to virtual

[33] http://icom.museum the museum standards are defined in the documents of ICOM statement, http://icom.museum/who-we-are/the-vision.html. Retrieved on 01-06-2014

museums. In turn this entails that the virtual museum must guarantee the inalienability of the collection, the condition of permanent institution, the existence of a statute or an internal regulation of for the functioning of the virtual museum. Going further in the application of ICOM standards in virtual museums I could also mention the preservation of digital assets in a format capable of lasting for years, or capable of being upgraded periodically by museum professionals in order to make it accessible for virtual visitors; digital accessibility of the virtual museum, applying W3C standards for global access for disabled people with disabilities; the guarantee that the technological platform of the virtual museum can be upgraded periodically, to last for the same number of years that a tangible brick and mortar museum is supposed to last, and so on. It is up to museum professionals to find out the maximum number of museological standards to be fulfilled by their virtual museum projects, in the same way as brick and mortar museums.

The second is from Schweibenz who states that "*the prerequisite for the 'virtual museum' are digitized data*" (Schweibenz, 1998: 191).

I would like to mention another of Mairesse's notes on the subject, where he writes that the museum, as an institution, is different from museum as an establishment. One should note that questioning the institution, even purely and simply denying it does not mean that it has left the museal field, in so far as the museal field can extend beyond the institutional framework. In its strict sense, the term virtual museum takes account of these museal experiences on the margin of institutional reality (Mairesse and Desvallées, 2010: 44).

This note endorses my definition, even if he does not approve like of the term 'virtual museum' at all, but I do feel that we are on the same wavelength because I include

tangible museums in my definition of virtual museums.

I have reached this definition of the virtual museum after my experience with ICOM and AVICOM, after my observation of the different examples I will mention in Chapter 3 and through my opinion on what constitutes the 'virtual' and the 'real', on the differences between a tangible and an intangible museum.

A museum is a museum. A museum is something that has the mandatory mission to preserve and to communicate heritage, and through this definition all brick-and-mortar buildings holding significant objects for current civil society for the next generations are to be considered museums. However we have also seen that after the 2007 ICOM conference there is also the question of intangible heritage to be taken into consideration as well as examples known as virtual museums by the professional and academic community. In my definition I have stressed the importance that the virtual museum must meet the maximum of museological standards defined for tangible museums. This means that if someone builds a repository of intangible heritage using a digital support making it available for browsing on the Internet or other technological means, the "what if…" question for the next 10, 100 years must be considered. It might seem to be a joke but what happens when the domain expires? What happens if video-interviewees refuse to grant access to their images? What happens when virtual museums use technology requiring permanent updates and change platform?

The list of examples I have studied in 9 years of PhD research is cluttered with unreachable websites, obsolete technology, CD-ROMs that can no longer be viewed. Are they virtual museums? They were when they were built, but they are no longer

because in accordance with my definition they no longer grant public access, a contradiction in my definition that I am well aware of, and that I mention here as a provocation.

My involvement in ICOM and AVICOM will be useful, if I can stay there after the next elections, because I can help museum professionals deal with the potential of virtual museums. One example is the *Memoro project*[34] that I will mention in Chapter 3, in Category D of virtual museums, creating a flat repository of memory, accessible for all publics. Commissions have to cope with the mission of museums and make the technological and political choices to make this heritage accessible to the public for the longest period of time possible, so that the technology chosen is capable of lasting for years, as well as the political endorsement and funding for the virtual museum to survive. *Europeana* may shut down at the end of the EU project funding. It is not only a website, it is a museum and must deal with the meaning of heritage and its mission as a museum.

1.10 Conclusion

My intention in this first chapter of my thesis was to define and circumscribe the field of my research.

It is important for me to refer to official ICOM, ICA and IFLA definitions, because the role of UNESCO plays in heritage, but also due to my involvement in this organization. In this sense, as will be explained in the third chapter, I will go on to use these definitions to describe the examples that I will present in describing the six generations

[34] http://www.memoro.org. Retrieved on 01-06-2014

of virtual museums. However, because the idea of technology is important in my research, I have tried to circumscribe it to an examination of the concept of technology that I will examine as new technology, or what is meant by the term 'emerging technology'.

On the other hand, I have also tried to describe different ideas of the museum, including my own, according to ICOM's definition but also following a new, emergent museology with Daniele Jalla, Giovanni Pinna and Alessandra Mottola Molfino as preeminent museologists in ICOM and ICOM-Italy[35]. In my definition of the museum I have focussed on the communication function of museums, more than that of collecting, cataloguing and preserving because, even if these functions are aided by technology, for me it is in the communication of heritage that new technologies provide service for society as a whole.

Having provided all these definitions, I have worked out my own definition of virtual museums to be developed further in Chapter 3 where I will provide examples and explanations of the six categories using the materials to be introduced in the next chapter. The definition of the virtual museum that I have provided is directly related to and dependent upon ICOM's definition of the museum; this is crucial for investing the virtual museum with the same dignity as 'traditional' museums, in accordance with new ICOM policies (Donahue, 2004: 1).

In the following chapter I will introduce a neglected but very important unabridged document by McLuhan, potentially a key reference in considering the virtual museum as a new medium.

[35] Daniele Jalla is on the international executive board of ICOM, and is a former president of ICOM Italy as was Giovanni Pinna. Alessandra Mottola Molfino, for years on the executive board of ICOM Italy, is former president of 'Italia Nostra', an association devoted to preserving tangible and intangible heritage in Italy.

II. The virtual museum as medium

2.1 Introduction

In this chapter I will focus on the question of the museum as medium. As a reference I intend to introduce a highly rare and important work by Marshall McLuhan for two reasons. The first is that it is of crucial importance in both the field of technology and interactivity in museums and for the communication of heritage. The second reason is because the main aim of my thesis is to contribute to the ICOM/AVICOM professional community, generally educated in the Liberal Arts with little background in technological studies, and who tend to consider the phenomenon of new media as media, not as technology. Throughout his production McLuhan provides a key to understanding media contexts, and in this unpublished work he provides a valid contribution to the debate on new media in museum contexts that may help in increasing awareness of the phenomenon of 'virtual museums' among museum professionals, considered as new media and not only as technology.

I will also present the work of other researchers on defining the museum as a medium (Hooper Greenhill, Silverstone, Jalla, Mottola-Molfino), and, through the process of 'remediation' described by Bolter and Grusin, I will also provide a definition of the virtual museum as a medium. It is important that I refer to the work of ICOM members

because ICOM is the most important organization of museum professionals and the members of this organization are widely recognized as key-speakers in this context.

The other main concepts that I aim to analyse in this chapter are the concept of 'space' as a channel of the medium-museum, and the process through which the virtual museum can be defined as a medium, using the process of remediation as described by Bolter and Grusin, but also by other important theorists of the concept of local and glocal space.

In this chapter I will also deal with some historical definitions and experiments in the field of the virtual museum, touching the concepts of new media and remediation theory for greater understanding of the issues involved.

2.2 The museum as a medium – McLuhan

As we will see in this chapter, I endorse Marshall McLuhan's statement that the museum is a medium, which I found in the transcription of a seminar he gave at the Museum of the City of New York on the 9th and 10th October 1967.

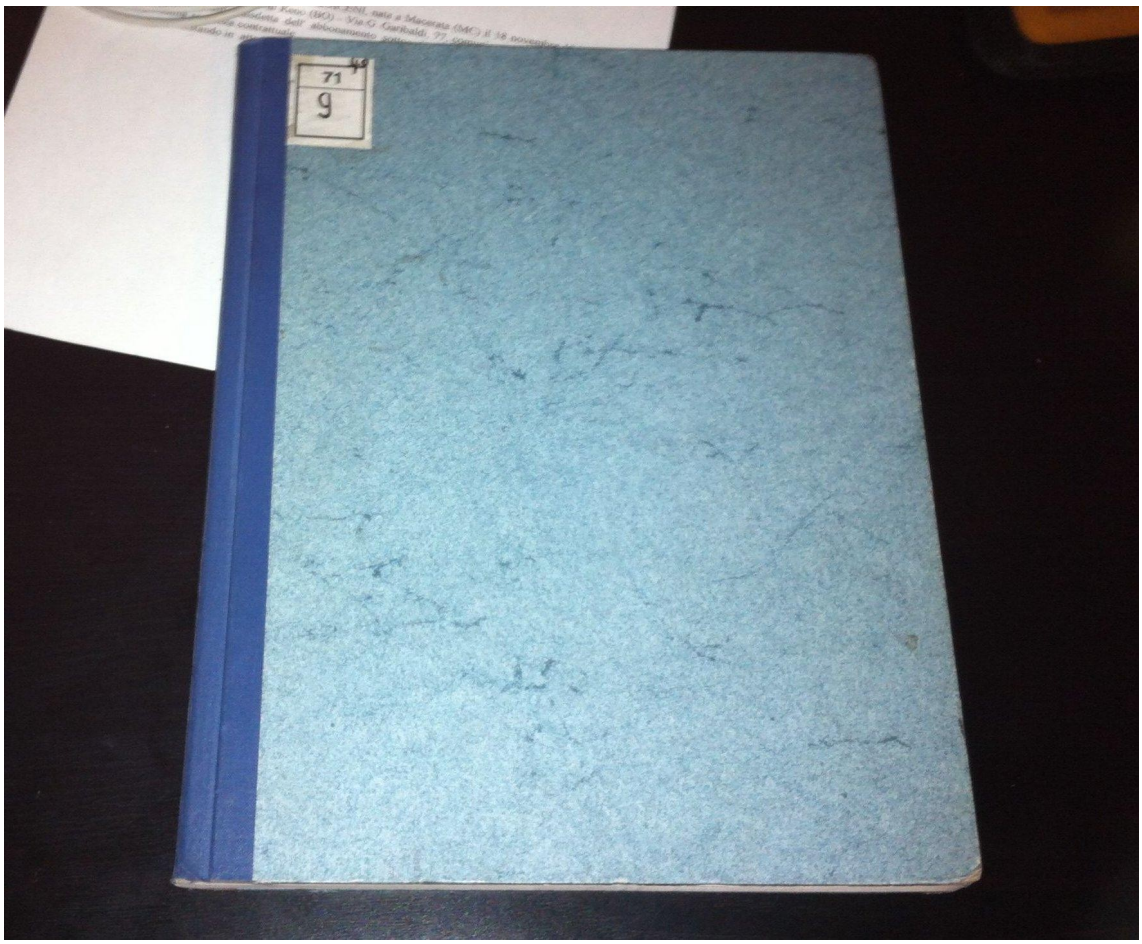


Figure 2: Cover of the seminar book. Simona Caraceni.

The importance of this document is crucial. It seems that only nine researchers in the world have ever made reference to this document, which is stored at the Library of Congress in Washington, with another copy held at the Library of Munich. The significance of this document for Museology and Museum Studies has been disregarded by Marchand (1998: 207), Alexander (1979: 18), Shanks and Tilley (1992: 277), Walker (2007: 137), Deloche (2007: 150), Lumley (2012: 6), Luckerhoff (2008: 70) and French (French and Runyard, 2012: 252), who have only dedicated a few words in their work to the importance of this document.

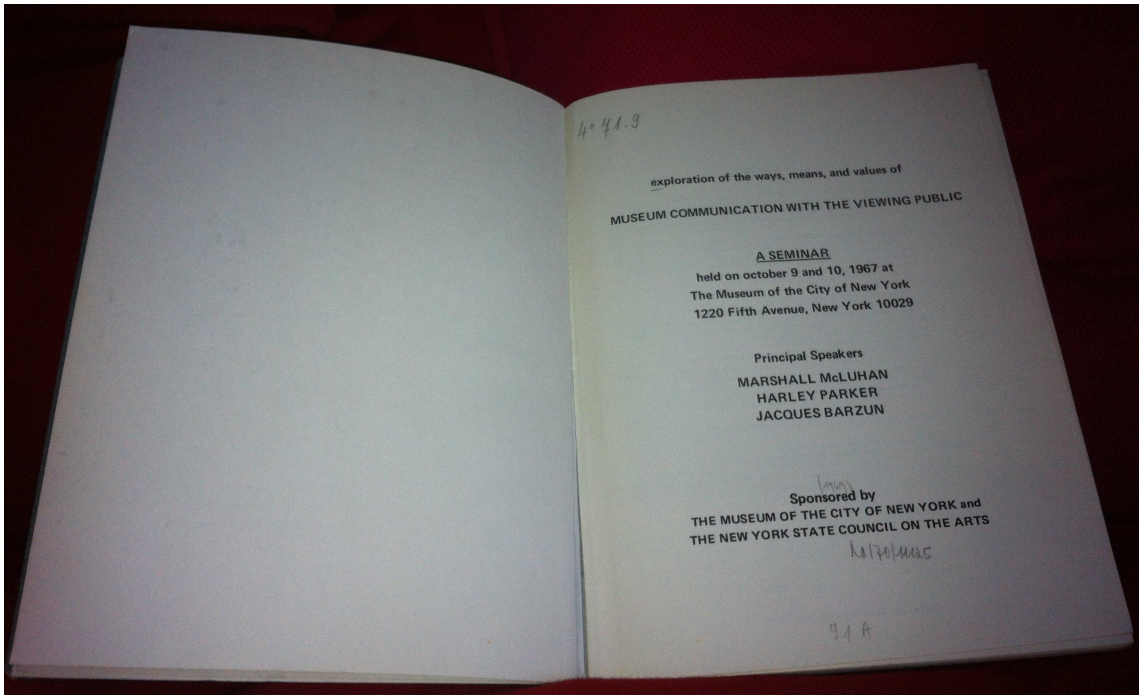


Figure 3: Front of the seminar's book. Simona Caraceni.

This document was discovered by an ICOM France member and Professor at the Descartes University in Paris who translated it into French, and used it for writing the definition of 'Communication' for ICOM's Official Dictionary of Museological terms (Mairesse and Desvallées, 2010). Although I disagree with this interpretation, as I will explain below, I found the document itself to be pivotal for the theme of the use of technology in museums. There is a French translation of the document, made by François Mairesse, the editor of the first entries in ICOM's Official Dictionary of Museological terms, published with the title of 'Key Concepts of Museology' called 'Le musée non linéaire : exploration des méthodes, moyens et valeurs de la communication avec le public par le musée' (McLuhan et al., 2008) which I discovered later on in my research work, supporting me in finding this document highly important for museology, both due to my field of research (museums and technology) and the theme of this document (museums and the media).

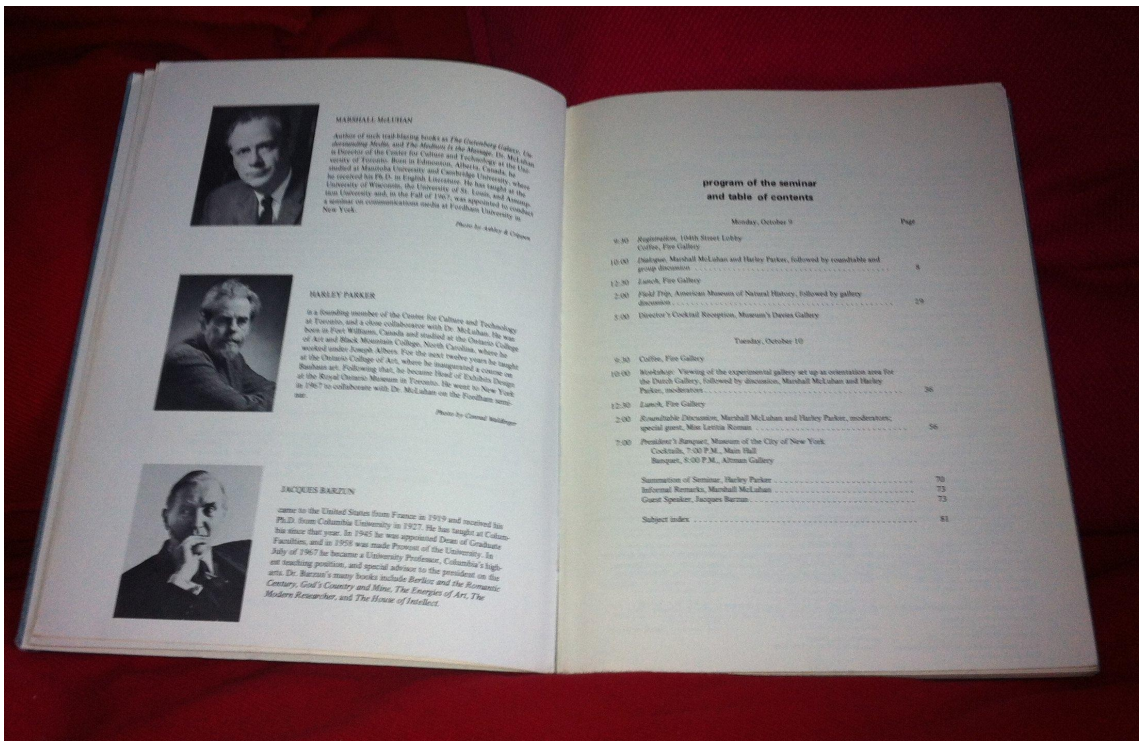


Figure 4: Photographies of the participants and index. Simona Caraceni.

I will refer mainly to this neglected work by McLuhan for two reasons. The first, which I have mentioned before is the fact that very few researchers have read and quote from this document, none of whom are working in the field of virtual heritage or in the relationship between museums and communication technologies. My intention here is not to diminish in any way the valuable work of the academics who have studied this document before me, as the statements by McLuhan quoted by them are totally suitable to their field of study. What I mean to say is that none of them have completely appreciated the full value of this document to the extent that is has never been related to the application of technology in the communication of heritage, seeing as this is not the field of interest of these academics. Therefore my task is to situate the text within the discussion on museum communication and the relationship between heritage, technology and communication. The second reason derives from the first. McLuhan is unquestionably the 'father' of media studies and his intuitions about the media have had

a great influence on Western culture, in this era of digital and new media. No mention of the concept of the museum as a medium can be made without McLuhan's references in this document, even though more recent researchers may not quote or refer to this work. I believe that my discovery of this document, putting it in the correct context and field of study (museum studies in the field of new communication media) can contribute new knowledge to the subject.

To introduce this work, it is the transcript of a recording of a seminar given at the Museum of the City of New York some time after the World Exhibition of 1967, in order to address the actions of the Director of the Museum concerning exhibitions, display and storytelling at the Museum. The highlight of this seminar was the inauguration visit to the 'Multi-Media Orientation Gallery' of the Museum, designed by Harley Parker himself.

> *Designed by Harley Parker as a multi-media orientation to the permanent Dutch Gallery of the Museum of the City of New York, the whole area was painted black with a few panels of ochre for contrast. The sight-and-sound sequence was controlled by a programmer which automatically turned on and off the various projectors and tape recordings. The sequence lasted about 16 minutes. The material included colour slides of Dutch scenes, with some models of New Amsterdam from the permanent Dutch Gallery, along with scenes of New York as it looks today; a movie in black and white showing New York Street scenes, featuring children at play; sound tapes which contrasted 17th-century Dutch music with the sounds of contemporary New York; Strobe-lighted manikins of a Dutch boy and girl; and a few artefacts. The projectors (except for #6 on the piano) were mounted eight feet above the floor. Numbers, 2, 4, 5, and 6 were Kodak Carousel fixed focus projectors with zoom lenses. Number 3 was a Kodak Carousel self-focusing projector. Number 6, hung from the ceiling, rotated clockwise a full 360°. The elevation diagram shows #6 pointing south. A white curtain stretched vertically on a concave form was intentionally disturbed for half its length by making random folds, and served as a screen for slide projector #3, as well as for the 16-mm movie projector (#1), which overcast on part of the slides.* (McLuhan, Parker and Barzun, 1969: 34)

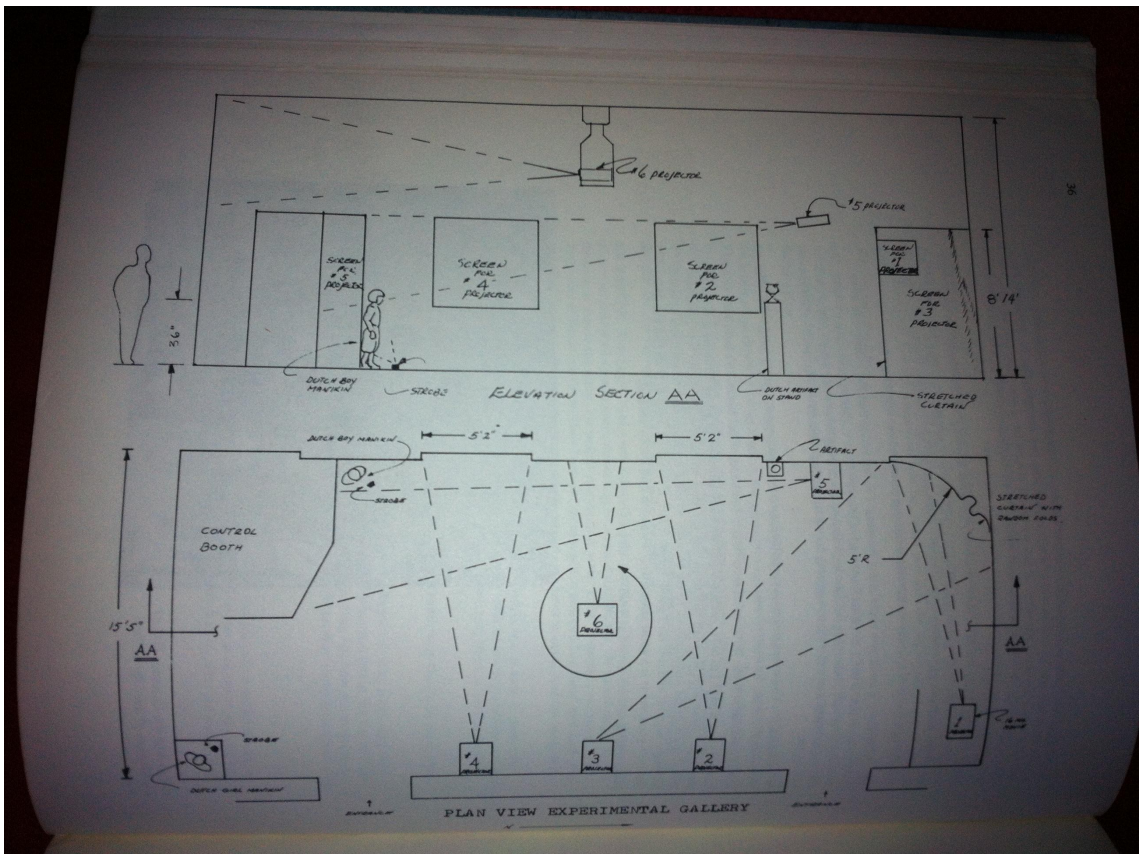


Figure 5: Parker installation. Simona Caraceni.

In another part of this document there is an interesting note about the interactivity of this Gallery, in the words of Harley Parker himself:

> *I have used a general label to identify an object. If you want more specific information, you press a button.* (McLuhan, Parker and Barzun 1969: 20)

Technically, this document has been classified by the Library of Congress as a 'book' containing the 'proceedings of a seminar', but its typewritten script and the lack of an official publishing house make it seem to be an unpublished work[36], if we do not take the French translation that has very few referrers into consideration (Ouellet, 2008; Bergeron, 2010). Stylistically, it takes the form of a dialogue between Marshall McLuhan and his friend and collaborator, Harley Parker, together with the other participants in the seminar including a question and answer session with the public. It

[36] Unpublished, but the French translation. According to my publisher Guaraldi we are publishing the original English version, and an Italian translation of the transcription of the seminar.

also includes a conclusion provided by Jacques Barzun that I do not find significant for my research work.

During the pre-seminar, consisting of a tape recording sent in advance to all the participants in the seminar, the main speakers, Marshall McLuhan and Harley Parker question the concept of museums and the use of technology therein. This is the most remarkable part of the document, making this congress a key reference point for all further Museum Studies related to technology. McLuhan states that the idea of the museum as a retrieval system for classified objects is not going to be acceptable for very long. He believes that people now feel the need to have a sense of the total surround of these objects and the total environment that produced them as well as the culture that produced them (McLuhan, Parker and Barzun, 1969: 1).

McLuhan states the uselessness of the museum as a retrieval system for classified objects, but the main difference between museums and archives lies in the definition of these 'objects'. For this part refer to the definition of archives and libraries in the corresponding chapter of my work. He also introduces the concept of the museum as a centre for the interpretation of the environment and territory, to be later taken up by new Italian Museology (as in the theory of the Genius Loci I will introduce later on in this research).

We will go now go further into McLuhan's definition of the museum for, after having considered his concept of museum as a medium.

2.3 McLuhan's definition of the museum

On being questioned by Mr. Keith Martin, Director of the Roberson Memorial Centre

about what a museum is, McLuhan replies that the museum is a kind of garden of the muses with the muses being understood as the various faculties of the human mind, extended out into the environment. In the same way that the computer world is an extension of the human nervous system into a total environment, the museum is a collection of the human faculties, mental, spiritual and sensory, extended out into the environment in a kind of consciousness (McLuhan, Parker and Barzun, 1969: 21).

Harley Parker goes to explain that the function of museums is to set up an environment which allows assumptions to be challenged, thus allowing creativity to occur, as well of permitting inter-cultural dialogue, of explaining one culture to another (McLuhan, Parker and Barzun, 1969: 21).

Other impressions on McLuhan's definition of Museums came from the transcript of the words of Mr. Robert T. Hatt, Director of the Cranbrook Institute of Science, Michigan: "*You made the comment a while ago that the museum tried to be a three-dimensional textbook*" (McLuhan, Parker and Barzun, 1969: 19).

Parker's definition of museums is also remarkable, given in front of the Hall of the Biology of Man, standing in front of a reproduction of abdominal organs: "*Take photographs of all this stuff, put them in printed form, and you have a book. It isn't a museum. The whole concept is a written one*" (McLuhan, Parker and Barzun, 1969: 27).

In response to a question by a Mr Ellin, McLuhan replied that it is important that we begin to recognize the fact that the museum is a particular medium of communication, with highly specialized attributes.

And suggested: "*We should begin to think about what these attributes are, and take some cognizance of the fact that we have a power to use this medium in its own special*

way for its own special attributes and purposes" (McLuhan, Parker and Barzun, 1969: 27).

McLuhan defined this exhibition form as: "*It's a prepared environment; prepared for special effects*" (McLuhan, Parker and Barzun, 1969: 60).

On the use of Technology in Museums Parker showed how multiple projections bring on almost immediate apprehension, rather the lineal and sequential development (McLuhan, Parker and Barzun, 1969: 1).

McLuhan's somewhat cryptic sentence-definitions seem to see multi projection as a mosaic of pictures, of sensations surrounding the objects in the museum. The concept of the object-oriented museum also came up in the discussion. The object tends to create an environment around itself: "*it creates for itself a new environment; it enables people to enter into totally new relationships to space*" (McLuhan, Parker and Barzun, 1969). This is the whole point of the concept of the museum as a medium: the relationship with space, the channel of the museum as a medium. Space permits the objects in the museum, territory, concepts and all human knowledge itself to be perused. In the seminar McLuhan and Parker amplify this concept of human feedback in museums, showing how artefacts tend to create their own environments, with the real artefacts made by humankind being not objects but rather environments and how for some biological or physiological reason, people never see an environment, but rather the content of environments (McLuhan, Parker and Barzun, 1969: 8).

In this reasoning the environment created by the artefact is the one from which it came. In this sense, museums have helped in the recreation of the original environmental process which produced the artefact (McLuhan, Parker and Barzun, 1969: 19).

Museum space is the space of *artefacts*, as McLuhan calls the objects in a museum. But in McLuhan's thinking, objects themselves are environments (if man-made), and as such create an environment, that the museum can amplify with exhibits and exhibitory techniques, particularly because these environments are invisible for visitors. By becoming visitors, human beings in museums are able to see artefacts due to the amplification of the environment McLuhan states that the necessary ingredients here are surprise and wit. The environment itself has now become a teaching machine and it is highly desirable to find out how and why this has happened (McLuhan, Parker and Barzun, 1969: 49).

In another passage a different point of view emerges concerning the use of technology in order to bring children and teenagers into museums. It is curious to note that back in 1967, as is still the case now, the commonplace that technology is attractive for young people and not for older people or the population as a whole is quoted, used and abused. McLuhan asks himself how children can be taken to a place where they feel absolute amazement at the world they live in. He believes that this sensation of empowerment of young people is happening for the first time in human history which begs the question as to how museums or art galleries can be arranged as to give people that sensation of power, of tremendous new discovery, of insight and perception (McLuhan, Parker and Barzun, 1969: 49).

He also makes the observation that the teenagers of his time display many of the manifestations of natives and pre-literate peoples (McLuhan, Parker and Barzun, 1969: 8).

At this point the concept of touch is introduced, of such importance throughout McLuhan's work and also in the document we are presenting now in terms of

museology. It is intriguing to compare McLuhan's words from 1967, with the existing experiments of touch interfaces in museum exhibitions to facilitate the understanding of heritage. He observes how the TV generation of the 1960s felt the need to handle all things in depth. For McLuhan the peculiarity about touch is the fact that it creates an interval which involves the audience very much more; the interval has to be closed, thus creating participation and rhythm (McLuhan, Parker and Barzun, 1969: 2). McLuhan also relates the concept of touch with that of 'power', connecting it to the other studies he devoted to the concept of touch[37] (1964; MacLuhan and Parker, 1968).

Again he stresses the fact that touch does not create a connection, but an interval, a fact highly relevant to the museum world, where a great passion on the part of the audience is the desire to touch the artefact (McLuhan, Parker and Barzun, 1969: 2). He states that the importance of touch is not to establish connections but rather participation, intervals for participation, a kind of relationship that museums, having grown up in the pictorial, visual and detached 19th century, have never really come to terms with the: human need for involvement and participation (McLuhan, Parker and Barzun, 1969: 2). As a curiosity for researchers it is remarkable that McLuhan gives the paternity of his concept of touch to Parker (McLuhan, Parker and Barzun, 1969: 7), and it is interesting to note some of McLuhan and Parker's suggestions for new ideas of the application of technology by museums, changing from education by concept to the training of perception, the total sensorium, the total human response (McLuhan, Parker and Barzun, 1969: 4).

McLuhan's suggestion is definitely in the direction of the enhancement of participation, of the enhancement of this model of the "*museum-pinball machine*" that reacts to

[37] The O.K. Moodle responsive environment (Moore, 1967) was a particular type of typewriter that tried to read the input of the writer

visitors' decisions, choices and inputs together with the new idea of the museum enhancing and training perception in its public, guiding visitors in increasing their knowledge, of having the perception of having chosen how deeply they wish to take advantage of the theme of the visit.

The other themes that McLuhan and Parker suggest are the idea of "*Pattern recognition*" and the difference between a gallery structured with a story-line, and the lineal narration in the museum being broken down by inter-active light shows for example. He sees a great potential for education in terms of pattern recognition rather than data assimilation (McLuhan, Parker and Barzun, 1969: 6).

This concept of the educational purpose of the museum visit provides many inputs for museum professionals. Only with active visitor participation can there be an increase in knowledge. And the lineal narration of the museum must be replaced by a pattern, a "*story-line*" where museums are thought of as books with the artefacts seen as illustrations (McLuhan, Parker and Barzun, 1969: 3).

And enlarging upon the idea that the museum is a medium that uses space as a channel, McLuhan suggest the use of "*lineal connected space*" with a "*missing bit*" to enhance the participation of visitors in the construction of meaning. He provides the example of EXPO 67 which was simply a mosaic of discontinuous items where visitors were free to discover and participate and involve themselves in the totality without being told anything about the overall pattern or shape of it with the result that they never got fatigued. For McLuhan continuous, lineal connected space brings on a sense of

claustrophobia and exhaustion because there is no means of participation (McLuhan, Parker and Barzun, 1969: 3).

He also shows how participation can be attained by simply arranging the spaces in which the cases are displayed, inviting the audience to supply the missing links in the style of whodunits where the links and connections between the evidence and the story is eliminated in order to get audience participation (McLuhan, Parker and Barzun, 1969: 4).

For McLuhan pattern recognition and absence of story line are crucial concerns for museums, showing how, after Poe, story line and perspective must be eliminated and process stressed in order to create involvement. If all the projections are filled in then the reader can only be a consumer of packaged goods, not a participant. Information overload leads to pattern recognition, where students become involved in the learning process, completely engaged in a voyage of discovery (McLuhan, Parker and Barzun, 1969: 11-13), with chronology forming the perimeter around the patterns, encouraging a proper understanding of space as understood in poetry and painting (McLuhan, Parker and Barzun, 1969: 22).

The public should be invited to manipulate the physical setting of the exhibitions through interfaces and various artefacts from different cultures brought together in order to create abrasive situations. These interfaces are deliberately created in order to incite discoveries, setting off situations that will irritate one another, bringing on sudden insight (McLuhan, Parker and Barzun, 1969: 5-6).

2.4 The museum as a medium – other contributions

Other researchers have also made contributions to the concept of the museum as a medium, even though they may not refer to McLuhan. Roger Silverstone (Durant, 1998: 162), defines the Museum as a highly specific medium that occupies a physical space, contains objects, demands interactivity, allowing visitors to traverse in the strict sense, its 'textuality', that is the way that certain topics are selected and presented and that can also be described and defined as an artificial space programmed in function of the eye of those persons traversing it in a an upright position, as noted by Clemente (1996: 70) and Jalla (in Gennaro, 2007: 13).

Jalla's remarks that the museum experience, unlike other types of contemplative or cognitive experience is experienced by means of the feet, as well as the eyes and brain. And he provides the example of the 'Homo museograficus', as interpreted and illustrated by Florence Pizzorni, an anthropologist working at the Musée des Arts et Traditions Populaires in Paris: a strange being consisting of two legs supporting a brain from which emerges an eye to which could be added a nose and ears should we wish to expand the faculty, but lacking hands in deference to the sacred principle that at museums it is always forbidden for the objects to be touched (Jalla in Gennaro, 2007: 13). Silverstone's expression allows no doubts: they allow the visitor, literally, to wander through their texts (Durant, 1992: 162). Here there is a pun on the words 'wonder' and 'wander', highlighting the sense of wonder for museums that I will go into further. Jalla shows how understanding the ground rules of the medium and its unique code and language means that visitors can become 'expert visitors' capable not

only of walking around the museum independently with no fear of losing the thread of the discourse or missing a critical piece or passage in their exploration of the collections, but understanding the rationale behind selection and presentation and therefore free to move with greater ease and safety and if possible feeling pleasure and freedom of movement to move through the collections exploring them as a whole, obtaining enhanced fulfilment and satisfaction of expectations, once the understanding of the codes of the device in situ is added to that of the messages (Jalla in Gennaro, 2007: 13).

There are however other seminal studies on the museum as medium, such as the works of Hooper-Greenhill (1994; 1995; 1998; 2000) focusing first on the educational role of the museum, and then on the role of the museum as a medium. In 1995 (Hooper-Greenhill, 1995: 10) she starts her research by questioning the the role of objects in virtual museums as media, following Susan Pearce's investigations into the nature of objects in museums (Pearce in Hooper-Greenhill, 1995: 15-23) and Krautler's (in Hooper Greenhill, 1995: 61-62) examination of Otto Neurath's ideas on the coincidence of the concept of museum and communication. Franders (in Hooper-Greenhill, 1995: 72) defines "*museum and galleries as media events*", and investigates the role of other media in communicating museum events. Kaplan (in Hooper-Greenhill, 1995: 38) focuses on the nature of exhibition as a medium studying certain examples of exhibitions on Nigeria. As Hooper-Greenhill stated, museums are institutions which use 'medium' and 'message' as an identical thought through material and the tangible (Hooper-Greenhill, 1995: 14).

In 1998 the American Association of Museum promoted a seminal publication edited by Selma Thomas and Ann Mintz (Mintz and Thomas, 1998) discussing museums' role as

media. In their introductory studies both editors investigated the role of media in museums and the function of the museum as a medium (Mintz and Thomas, 1998: 1-34; Mintz, 1998: 28-34): how the physical quality of the museum and its contents can be 'mediated' by computer and interfaces to a wider public. "*Media also play an important role in interpreting certain specific ideas, helping to make them more accessible to more visitors*" (Dierking and Falk in Mintz and Thomas, 1998: 57).

Now we will take into consideration Silverstone's concept of the museum as a medium, due to its usefulness for Italian ICOM museologists before going on to examine other museologists dealing with the concept of the museum as a medium such as Eilean Hooper-Greenhill.

2.5 Going deeper into Silverstone

Going further into the concept of the museum as a medium for Silverstone and others (in particular Jalla), the question is: what type of media are museums? How can they be articulated and participate in the more and more 'mediated' culture of the late twentieth century? In many ways, museums are similar to other contemporary media. Following Silverstone's discourse in Durant (1992), museums entertain and inform, tell stories and build a discourse; they aim to entertain and educate, to define a structured programme more or less consciously, more or less effectively; to make accessible and familiar that which would otherwise be alien and incomprehensible. Moreover, in the construction of the themes, features and technologies they use, they offer a description of a world modulated in accordance with a certain order of ideas. Obviously, Silverstone notes that there are also differences between museums and other media such as newspapers, radio

or television. Meanwhile, museums have to compete more and more with other tools of communication in order to solicit attention and attract visitors; this may also depend on other media, especially video recording technologies and computer interactivity, present within exhibitions; they must rely on other media both as sources of information and as tools for the dissemination of their products, from the very moment exhibitions are on the market, subject to criticism in the same way as any other cultural event.

Museums are places where communication takes place and within which complex meanings are negotiated. These meanings only partly depend upon those ascribed to the individual objects from the place they occupy within a historical, archaeological or aesthetic classification system (Durant, 1992: 34).

Museums, galleries and exhibition texts are constructed with a basis on different logics. Their existence is the result of a complex interaction of individual and institutional forces; in addition, they are consumed in many different ways by visitors. They appear, however, far from being arbitrary, as they are structured on the basis of their own internal rhetoric that seeks to instil in visitors the belief that what they are seeing and reading is important, beautiful, true. Museums are also structured narratively, through principles of classification and representation, creating stories, issues or, sometimes, more open logic, as well as locations and routes through which visitors are guided and helped to build a sense of what they have seen (Durant, 1992: 37). It so obviously the case that individual galleries or exhibitions, even entire museums express multiple logics. This can be attributed to the presence of sections built at different times within the same museum, or the existence of several museums within the same kind of collection and form of representation. A classificatory logic can overlap to a historical sequence, in a pattern that is often encountered in traditional museums of science and

technology, where the grand narrative of progress in setting and including the ubiquitous glass display cases and in the images they reflect. A historical narrative can be based on a number of different intersecting stories. The narrative forms, historical and otherwise, actually provide the framework within which the joint statement of the objects in the museum is displayed. The stories that are told about the objects, and the more global stories in which they play the role of actors, produce a form of limitation that can be respected or re-created by visitors. The latter walk (literally) and are propelled through the stories that the museum has prepared for them in the exhibition, thus creating, within the limits of that freedom that has been granted to them, their own version of the narrative which they have been confronted (Durant, 1992: 38).

Silverstone states that space is a fundamental element binding (literally) museum design. Shape, size, morphology and accessibility of the rooms are all factors determining the materials in each stage of the creation of a new exhibition. The amplitude of the visit, the likely path of visitors through the halls, the need to structure the exhibition of objects so that multiple paths are always feasible, are problems all too familiar to all designers of museums. Nevertheless, the spatial dimensions of museum communication extend far beyond these practical considerations, important as they are. However, there are still visitors who have to displace themselves to get to the museum, on arrival they are faced with physically ordered objects, images and themes, through which they pass, and from which meaning can be produced. This space is in several ways, a potential space, within which visitors are confronted with a proposal that they necessarily accept, that is to say, the invitation to create and complete the experience of being in a museum. A comprehensive and structured environment has been put at their disposal, through which they move and where they can play, in every sense; in a safe

world: in a certain way, an extension of the infantile form of involvement with other objects. Here they build their narratives with varying degrees of creativity and safety in the space prepared for them, physically, with the disposition of the rooms, and figuratively, by extending it to encompass the sphere of personal experience. This potential space that embraces and encompasses every act of communication is an essential part of museum communication, and the objects on display within draw meaning and power both from the meaning deriving to them as elements of a collection and from their claim to authenticity, but also from the fantastic work of processing that visitors can and must perform when confronted by them. The aura and magic of the exhibition or the entire museum are the result of the joint creative work that takes place in this potential space.

2.6 Going deeper into Hooper Greenhill

Eilean Hooper Greenhill has dedicated some of her seminal production to the theme of the museum considered as a medium. In her 'Museum, media, message' (Hooper-Greenhill, 1995), she considers the museum as a medium based on objects, deepening the relationship between exhibitions (of objects) and other media such as newspapers. Greenhill and other contributors to the work go on to examine the case of certain exhibitions, making important contributions to the question.

Otto Neurath, quoted by Krautler (in Hooper-Greenhill, 1995: 61), relates the museum with the idea of communication. He states that exhibitions are media that are both shaped and shaping, "*objects of practical use as tables or rooms*" (Neurath, 1973: 133). Neurath denied the importance of the museum object, stressing the importance of

"*clear, factual communication*" (in Hooper-Greenhill, 1995: 62) and useful visual messages. He also denied the power of precious objects in the eyes of visitors, preferring the offer of "*factual information, non-dramatic or emotionally stimulating headlines or mythical experiences*" (ibidem). Here Belcher's opinion that "*as a medium, exhibition has always been such that the novel and new have found immediate application, and that the rapid pace of technological developments assures exhibitions an exciting future*" (ibidem; Belcher, 1991; 37).

2.7 Surprise, amazement and wonder

Among these three terms there is, beyond their different origins, a close and easily discovered relationship by checking the definition given in dictionaries and the frequent cross-referencing as if they were synonyms. However they are not and with no intention of trying to thrash out their differences, Jalla notes the fact that both surprise and amazement go back to the concept of wonder (in Gennaro, 2007: 15).

While surprise and amazement would seem to be a product of wonder, the idea of wonder is somehow linked to that of admiration, helping museologists to answer a basic question: the reasons and purposes why they wish museums to produce surprise, amazement and wonder, as well as the effect of things at first, but also as a result of a communicative device designed to elicit this type of effect. Jalla continues to state that we can be amazed, surprised, feeling admiration before an object or a landscape offered unexpectedly before our eyes and that we may define as marvellous or beautiful. He provides the example of Senanques Abbey in Provence, situated at the end of a lane leading to a natural hollow in the centre of which appears unexpectedly an almost intact

Cistercian abbey, surrounded by wheat and lavender fields: its builders almost certainly did not think of this effect, they were almost more certainly looking for a secluded location suitable for meditation, work and isolation from the surrounding world (Jalla in Gennaro, 2007: 15).

Surprise may be the opposite to the effect sought, the means chosen by curators to catch visitors' attention, to stop them in their tracks and force reflection. The other example Jalla provides concerns the Musée Dauphinois in Grenoble, where after passing through a long room exhibiting furniture and furnishings from Quieras, an alpine region famous for its wooden handicrafts, he noticed a small box, very similar in decoration and design to the other exhibits displayed in a corner. The explanatory card was situated in such a way that it could only be read after having passing the exhibit and it explained that, contrary to expectations, the box was not from the Alps, but from Nepal, demonstrating the generality of a certain type of wood carving (in Gennaro, 2007: 15).

But otherwise Jalla doesn't think that the wonder "*of the museum could be the end*", because this would make the museum a different type of institution, more like a sideshow at Luna Park than anything else, but it could certainly be a means. Not necessarily the only one, but one of many means for communication. As a product of a gap and a difference, present in the things or as a product of display, but always with the condition of the visitor's eyes and head being able to perceive them (in Gennaro, 2007: 15).

For assuming this Jalla refers to Peter Greenblatt, who in his famous essay entitled

'Resonance and Wonder' (Greenblatt, 1990: 42) identifies what he defines as "*two distinct models for the exhibition of works of art*" calling them resonance and wonder, resonance meaning the power endowed in objects on display to cross their formal limits and assume a broader dimension, evoking in those looking, the complex and dynamic cultural forces from which they emerged and which can be considered by a representative sample by observers. And considering wonder the power held by the displayed object to stop the observer in his or her steps, communicating a sense of uniqueness arousing intense attention.

Jalla refers to those two definitions perfect in their clarity and perspicuity, and yet, in light of the foregoing considerations, he is critical of the fact that reference can be made, as Greenblatt does, exclusively or primarily to things in themselves, neither to devices put in place to communicate; the same object may arouse wonder or resonance, depending on the observer, it also possible that the two effects may coexist in the same person, depending not so much on the observed object, but on the relationship established, taking the visitor's baggage of culture, ideas and values as a starting point, as well as the means used for communication (in Gennaro, 2007: 15).

If it is true that the museum is its audience, much depends both on this and on the relationship that the museum is able to establish, in terms of wonder and resonance between things, and visitors, through communication strategies that are capable, to the greatest extent possible, of making the crossing from wonder to resonance.

The great psychoanalyst Bruno Bettelheim quotes Francis Bacon's maxim that "*Wonder is the seed whence knowledge is born*" warning that this statement is not reversible: rational knowledge cannot generate wonder, which is an emotion (Bettelheim, 1990: 192). This statement is controversial because it could be argued that there are also cases

that contradict it. It is still true, however, and not only for the children that Bettelheim's essay deals with (its original title was 'Children and Museums'), the conclusion to which he comes by stating that the biggest value that museums may have irrespective of their content is that of stimulating and more importantly, fascinating the imagination; awakening curiosity in such a way as to drive us to penetrate ever more deeply into the meaning of objects, providing the chance to see, each in their own time and pace, things that are out of reach and, above all, to communicate a sense of reverence for the wonders of the world. Because in a world that was not full of wonder, it would not be worth growing and living (Bettelheim, 1990: 192).

For Roger Silverstone "*objects have their own biography*" (Durant, 1992: 35). He states that they move in the public and private arena inside and outside the universe of goods and merchandise; produced in factories, artists' studios or artisans' workshops, they may end up in a scrap heap, on a shelf in a living room or in a museum display case.

Silverstone refers to Igor Kopytoff's idea where people and material objects do not have a single biography, they have many. A car, for example, has an economic biography: its initial value, the prices fixed in subsequent acts of sale, the rate of devaluation, the effects of the recession, trends in maintenance costs over the years, but it also has many others of a social order. One biography may focus its analysis on the place occupied by a car in the owner's household another, perhaps, on the history of positioning of the owner with respect to societal class structures and a third may focuses on the role that automobiles play in the sociology of kinship ties within the family: their gradual fall off in America, for example, or their consolidation in Africa (Appadurai, 1988: 64).

The point being of course, that the biography of an object receives meaning from the different social, economic, political and cultural contexts it traverses: in turn, this traversing may illuminate these contexts, in the same way as lightning and rockets light up the night sky.

According to Charles Saumarez-Smith, Silverstone states that neither the biography of an object nor the specific contribution made by museums are univocal (Vergo, 1989: 6-21). It would be banal to note that the objects displayed in a museum are almost always separated from the world that produced them and in which they took on different meanings; after they reached their final location and were welcomed into a collection, either on display or in storage, it is obvious that their meaning has been indelibly fixed so to speak. Yet even in a museum, Silverstone remarks like Saumarez-Smith, there is life after death, or at least some form of life. The pitted moss-covered sculpture of a Saxon god having spent most of its existence in different English gardens, a late eighteenth century lintel, or an extension from the same period, have all undergone some transformation in their journey through the Victoria and Albert Museum: the statue is now on display – a little reluctantly – alongside polished and elegantly restored statues with very different origins and aesthetic intentions; the lintel has become the cornerstone of the accessory shop as well as a company logo, the interior of the room, packed in polyethylene, and awaiting a decision on what should be its fate.

Silverstone goes on to refer to the permanent exhibition 'Food for Thought' opened at the Science Museum in London in October 1989. Some of the exhibits are completely familiar to the public yet; the shock of displacement produced by seeing them on display in a museum urges visitors to 'rethink' in new ways. If the inside of a

McDonald's or the supermarket checkout offer visitors a safe link between the everyday world and the exhibition in the museum, other, much less familiar objects – a series of machinery used in the food industry, pose other instances such as rebuilding a manufacturing process that casts no light on who worked with these machines and the conditions in which they operated. Similarly, perhaps in more conventional ways, the exhibition also presented 'historical' objects, a kitchen interior with original artefacts, examples of old packaging: each with its own biography, each 'rescued' from the museum. All mutely appealing to visitors to integrate their meaning.

The construction of specific biographies of objects, undertaken by the museum's collection to motivate acceptance of collections or exhibitions, is resolved by an abstraction. The meanings that arise are necessarily partial, but – and this is what counts most – they are an essential part of specific assumptions of authority and legitimacy upon which depends the status of the museum taken as a whole. In fact, the museum acquires its distinctive character through objects, and more precisely through the objects placed in the context of the collection.

Two factors complicate the issue further, especially in contemporary exhibitions. The first difficulty relates to the recognition that the meaning of an object does not end with its display and is not even determined definitively despite the location or description that can be read on the label. The meaning of an object is being continually reworked through the imaginative activity of the visitor, who invests it with his own experiences and emotions.

As Ludmilla Jordanova has observed and Silverstone notes, objects displayed in museums become a kind of fetish as the sign of hyperbolic focus, frozen in time and space, an expression of the postulates of domination embodied in the very structure of

museums (Vergo, 1989: 22-40). The object has a magical power calling for a kind of identification with the Other, detached and inter-penetrated at the same time. This dialectic of distance and proximity is of course a commonplace in the analysis devoted to the operations of contemporary media. Indeed, this feature can even be recognised as an essential feature of their definition: what is familiar becomes alien, the strange becomes familiar. However, neither the attention nor the identification required by the exhibitory rhetoric of objects can be guaranteed only through their exposure or classification. Visitors are actively involved in what they are seeing.

The second complication that Silverstone recognises, revealingly staged in the galleries devoted to 'Food for Thought', and constituted by the presence in the presentation of non-objects (demonstrative models, audio-visual technologies, computerized interactive information points, panels with text or illustrations), forwarding another, completely different claim, to provide an experience of reality. Silverstone reminds us that Alan Morton noted that the trend – more and more commonly practiced by museums – to use technology and modern media, including certain components of an interactive multimedia experience, museums having directed themselves towards market criteria (Lumley, 2012: 147-154), and therefore this orientation echoes and reinforces the temptation to present the exhibits with their value as goods. Reality recalled through these media objects and reality rooted in the experience of everyday life and in the domination exerted by the mass media. Thus, in addition to instances of objects finding their motivation in the authority of the past and in that of the curator, these technologies propose their own authority through familiarity and seduction, practicing what Umberto Eco and Jean Baudrillard would call 'hyperreality', the over-mediated world of simulation and self-reference, that we now take for granted in everyday life (Eco, 1986;

Baudrillard, 1981). Silverstone reports the conclusive evidence about the status of objects in the museum and significantly expressed by Eugene Donato:

> *The set of objects presented by museums is based solely on the conventional assumption that they constitute a world of consistent representations [...] If this convention is broken, nothing of the Museum is left, but bric-a-brac, a heap of fragments of objects without meaning and value that are no longer able to represent themselves metonymically, replacing the original object, or metaphorically alluding to its representative character.* (Donato, 1980: 213)

Silverstone concludes that "*an object is not null if it not does not form part of a collection, a collection is not null if it fails to affirm a classificatory logic capable of evading arbitrariness and transience*" (Stewart, 1984). In their collecting activities, museums provide both a model and at the same time an echo of consumerist activity in 3 which we are all involved, extrapolating from a world of commercial values objects that acquire their meaning from the fact of being welcomed into our symbolic universe (Paltrinieri, 1998: 128). In any case, there something in the museum that clearly exceeds the work of classification: it is true that objects derive their authority from having a place within a system of classification, and it is also true that they acquire their meaning within the classification attributed to their location within the exhibition. Again, as I have noted elsewhere, the meaning of an object or exhibition depends significantly upon the activity of 'care'/attention of the visitor, who rewrites objects within using his or her own culture of memory and experience (Macdonald and Silverstone, 1990: 176-191). However, the very possibility itself that reconstruction takes place is based upon the existence of an exhibition designed/arranged – or not – according to the logic informing the entire collection.

Wonder in the case of both exhibitions and virtual exhibitions has been concisely defined by Witcomb:

> *[…] When a physical reaction to an object involves an emotional response that leads to a greater level of understanding. […] The process in exactly the same with the multimedia installation […] The experience offered to the viewer is both physical and emotional.* (Witcomb in Cameron and Kenderdin, 2007: 41-42)

In the same way, Manovich quoted by Fiona Cameron states that "*digital and physical collections can function as interactive conduits in engaging emotional experience, and in extending memory, recall and identification*" (Cameron and Kenderdin, 2007: 56).

Museums as media have this dimension of 'wonder', an important quality in the field of the museum as a medium. But there are some other implications in this concept, such as 'the museum as device', which we will investigate in the following section.

2.8 The museum-device

It is important, on talking about museums as media, to make a parallel with Foucault's concept of 'device'.

In addition to being in many ways a multi-directional text, the reading of which passes through some sort of physical route within it and uses the space as part of the text itself, the museum is also a device consisting of the elements making up the museal text and directly or indirectly, of the museum experience. It is a device in a more restricted sense than that defined by Foucault his 1977 'The Confession of the Flesh' interview[38] (Agamben, 2006: 5), although his definition of a device as a heterogeneous collection of discourses, institutions, architectural interventions, laws, standards, scientific statements, moral, philanthropic and philosophical propositions, of relationships established between these elements and, with certain necessary adjustments, are well suited to describe the museum as a medium or text.

[38] (Foucault, 2008) for the Italian edition, and for the English I refer to Colin Gordon, ed., Power/Knowledge (New York: Pantheon, 1984), 194-228.

The text or device is determined first of all by the process of selecting, ordering, and placing of things but also by the equipment and technical or scenographic elements that make up the installation and the illumination of the environment. And, like any other text, it is made up of the narrative code and the logic of the discourse corresponding to the physical location and the style of the setting as well as by the morphology of the space, including even the colour of the walls and the characteristics of the floor, to take one example from the many elements involved in the construction of a museum or exhibition device. Many other factors intervene in the museum experience, partly related to the shape and structure of the museum as a whole, partly to the characteristics and conditions of the visitor and the context in which the visit takes place. To fully understand a museum, a visit cannot be limited to the observation of the display rooms; it is often not even enough just to see the images on display; it is necessary to see it alive and animated by the public, to understand the choices that visitors make, often completely different from those expected and suggested by the exhibition. And this is what makes the participative observation of the public so important; the study of behaviour aimed at discovering the effects produced: an experience that we can carry out empirically by blending ourselves together with the visitors to discover in and through them to what extent the device, the quality of the works, the quality of the installation, even the strict interpretation of some museum purpose, works or not, whether it succeeds in communicating what was intended to be communicated or not (Jalla in Gennaro, 2007: 13-14).

Foucault's theories applied to digital heritage are significant for the definition of "*technology of self*" (Foucault, 1988: 18) linked with Foucault's concept of

'governmentality': as Fiona Cameron has noted the heritage industry can interact with communities to build a cooperative history, or cultural meaning (Cameron in Kalay, Kvan and Affleck, 2008: 180).

Foucault's opinions on museums are hidden throughout his enormous production. As was noted by Lord (2006), in her seminal text on Foucault's thoughts about museums, his idea of the museum is also related to Deleuze's concepts of the 'diagram', and power. A diagram is "*a display of the relations between forces which constitute power*" (Deleuze, 1988: 36) and this display can act as a device (*dispositif*) that can integrate the subjects built with functions of power (Deleuze, 1992). Hetherington (2011; 8-9) noted that this concept became significant in all of Foucault's production, from 'The Order of Things' in 1966 to 'Discipline and Punish' in 1975, making up a pattern for the understanding of Foucault's opinion on museums. Museums are diagrams to display culture as are libraries or/and archives and can become related to the idea of 'display' and 'spectacle' as has also been noted by Massumi (2002). However according to the definition of museum they also aim to entertain, in addition to the other important functions of collection, classification, interpretation and the production of educational resources. In this way and also through their display of objects, museums are political objects, related to the notion of the Panopticon (Hooper-Greenhill, 1989).

Foucault defined the museum as a heterotopia starting from his first mention of this concept in the preface to 'The order of things' (Foucault, 1966: xviii ff), up to the definition of the six principles of heterotopia as a mirror, crisis heterotopia and heterotopia of deviation. Or a "*single real place they can bring together several emplacements that are otherwise incompatible*" (Foucault, 1998b: 181) where museums are mentioned directly as heterochronia together with libraries and archives, because of

the nature of place where the time is accumulated by a public choice, unlike the past as an individual choice and as spaces with a complex relation with time, in contrast with festivals and fairs, operating as in the sixth principle of heterotopia between enclosure and openness. Shapiro (2003) reporting the only lecture that has survived from a unpublished book that Foucault was writing on Manet, suggests that the art museum is a space that can be defined by the works of people like Manet, as a space of resistance because it makes the problem of the position of the subject apparent, pointing out that the best space to view artworks is the museum, (Shapiro, 2003: 312) a theme that is also present in the preface of 'The order of things' in the section about 'Las Meninas' (Foucault, 1966: 1-15).

Foucault finds a relationship between Flaubert and Manet in the relationship of archives and museums: "*They erect their art within the archive. [...] Flaubert and Manet are responsible for the existence of books and paintings within works of art*" (Foucault, 1998a: 107) and also, describing 'Déjeuner sur l'herbe', he defines this painting as

> *perhaps the first 'museum' painting, the first paintings in European art that were less a response to the achievement of Giorgione, Raphael and Velasquez than an acknowledgment (supported by this singular and obvious connection, using this legible reference to cloak its operation) of the new and substantial relationship of painting to itself, as a manifestation of the existence of museums and the particular reality and interdependence that paintings acquire in museums.* (Foucault, 1998a: 107)

So, to make a point from Foucault's complex thoughts about museums, "*the museum continually transforms the visual apparatus of display, not least because what is on display is in continual dialogue both with the discourse establishes around museums and also within the gallery environment in which it is displayed*" (Hetherington, 2011: 47).

After this digression on museum as a device, it is important to concentrate on the

concept of ‘space’ as the medium of museum, and in this field I will refer in the following chapters to certain theorists that I have found useful for my research in this field of study.

2.9 Space as a medium in museums and virtual museums

It is important at this point of my research to highlight the significance of space as the channel of the museum-medium; it is also important to be aware of the relationship and the differences between tangible and virtual museums. As will be seen in the following chapter, where the differences between visits to virtual and tangible museums will be considered, ‘space’ in virtual museums must be considered as virtual space; the only experiences of virtual museums falling into this category are metaverse experiences, such as museums in Second Life or other metaverses. I will briefly talk about some cases of Second Life experiences referring to my Categories A and F of Virtual Museums in the third chapter of this research. I refer to experiences carried out in Second Life (and also OpenGrid, one of the successors in the use of this kind of Virtual World). Stephenson created the term ‘metaverse’, but did not explain directly what he meant by it (apart from writing a novel about it) (Stephenson, 1992). Other definitions came from Koster as “*a virtual world is a spatially based depiction of a persistent virtual environment, which can be experienced by numerous participants at once, who are represented within the space by avatars*” or that of Bell: “*A synchronous, persistent network of people, represented as avatars, facilitated by networked computers*” (Bell, 2008: 1) where the concept of space is missing, in its place the concept of technology used to make actions which can be experienced by numerous participants

simultaneously is stressed.

As space is the medium of museums, so virtual space is the medium of virtual museums. And only virtual spaces that propose a three dimensional space in the same way as tangible ones are relevant for experiences of virtual museums that can be readily compared to those in 'tangible' museums.

> *Mr. Parker: I would love to try a gallery, somewhere, with no labels.* (McLuhan, Parker and Barzun, 1969: 14)

This sentence from the work of Parker and McLuhan reminds me of the work of current Italian museologists: the renowned Daniele Jalla and Alessandra Mottola Molfino.

In Andreini (2009: 19-25) Mottola Molfino narrates her experience as former Director of the Poldi Pezzoli Museum, a gorgeous house in the centre of Milan, donated with all its priceless contents by art lover and connoisseur Gian Giacomo Poldi Pezzoli. Without referring to all the Renaissance paintings, ceramics, *objets d'art* and the rest of the contents of this important house-museum, I would like to make reference to the Armoury. Alessandra Mottola Molfino commissioned the renewal of this space to the artist Arnaldo Pomodoro between 1996 and 2000, after its destruction during the Second World War. In this gallery, as you can see in the image, the whole space was built as a cave, with tusk-like columns holding up the ceiling, giving the impression of an ancient warriors' den used for hoarding the trophies of war. In this place the sense of wonder is very important as are the impressions pursued by visitors entering this space. Alessandra Mottola Molfino did not want there to be any identification for the objects on display; the visitor will find no description of the different origins and periods for the firearms suits of armour, cuirasses and swords. Visitors' impressions are crucial for this new 'Wonder-Museology', not the information that visitors can learn from their visit. It

is important to note that this is not the only example of an armoury without identification tags. Probably it takes inspiration from the Armoury at Graz.

Figure has been removed due to Copyright restrictions.

Figure 6: Poldi Pezzoli Museum. Courtesy of Liricigreci.it

In a talk that I had with Federica Manoli, Registrar of the Museum and student of Mottola Molfino, some interesting matters came up. Even though an audio-guide to the Museum is available, and Arnaldo Pomodoro himself has provided a commentary for the Armoury and on all the objects on display, as is the case in every museum in the world, very few people decide to use the audio-guide[39] as an aid for their visit, and many people report the lack of labelling as a drawback for this Gallery. Federica Manoli told me that the Museum is planning to put labels in this Gallery, because of these frequent remarks by visitors. This is one case where the use of technology can be useful in order:

- not to lose the Wonder effect of the Armoury itself;
- to add paratextual information that visitors can decide to read or not, at different levels of depth.

The audio-guide has been defined "*the first visitor technology used in museum was handheld [and] invented in 1952*" (Tallon and Walker, 2008: XIII).

Going back to the thoughts of Mottola Molfino and to museum theories on the use of

[39] On the theme of audioguides I go further into the concept in the chapter on paratextual information, and more specific studies on audio-guides (Christensen, 2010).

the written word in museums, I would like to refer to an article by Giulio Pozzi in the Italian 'Giornale dell'Arte':

> *The explanation virus risks reducing experience to use. People don't have time anymore to look, and at the same time stare. To touch and also love. Look, use and forget: this is culture today.* (Pozzi, 2004)

This seems to introduce postmodern themes in museums that will not be discussed here, but it also suggests the fact that according to Italian museology it seems to be more important to create emotions in visitors (Jalla in Gennaro, 2007) than to increase their knowledge of the heritage on display (Macdonald and Silverstone, 1992; Amodio, Buffardi and Savonardo, 2005). However in line with the aim of this research, I would like to go further into McLuhan's opinion here that nothing need make sense, with sense being something that each person must 'make' on their own (McLuhan, Parker and Barzun, 1969: 20).

Harley Parker also provides some considerations on activities related to new technology, and more advanced types of museums, where visitors casually glance at something, read the label, casually glance and walk on (McLuhan, Parker and Barzun, 1969: 20).

And here Parker is referring to the model of the 'Quadreria', the oldest type of museum, such as the Uffizi or Palazzo Pitti, substantially created as galleries lined with paintings, in order to create a sense of wonder and of the power of the owner of the gallery in visitors. Here I will quote again the lines where Parker explains the functions of the buttons in his experimental gallery, with a note that I omitted before:

> *Mr. Parker: Let's have an opportunity to look at something without reading the label. I have used a general label to identify an object. If you want more specific information, you press a button. The interesting thing is that very few people press the button except children, and they press it to watch the light come on.* (McLuhan, Parker and Barzun, 1969: 20)

This is an intriguing note by Harley Parker, about the use of buttons in 1967. And it's also interesting in the age of television. When black & white TV came out the basic interactivity with this medium was through changing the volume, the brightness and the saturation of output through the television interface, before interaction with the remote control that allowed changing channels and naturally also control of the different levels. There is a fascinating anecdote of Parker's moving experience of walking through the Museum after hours with the lights dimmed, and how this lack of strong, clear light created a greater sense of involvement. He also shows how the human eye has been developing under constantly fluctuating light and states the case for constantly fluctuating light in museums (McLuhan, Parker and Barzun, 1969: 10).

As I wrote in the definition chapter, I do not intend to deal with lighting engineering, but it is important to note in this quote from Parker that it would be interesting to allow visitors to manipulate the atmosphere inside galleries and exhibitions. Coming back to the theme of the buttons, McLuhan provides the example of a button that when pressed would give the instant environment from which the artefact originally came, in opposition to the opinion of Dr. Dockstader who says that original environments are impossible in museums (McLuhan, Parker and Barzun, 1969: 20): "*I have already remarked upon the importance of a control console for lighting in museum above*" (McLuhan, Parker and Barzun, 1969: 5).

Another time McLuhan in 1967 argued for the possibility of the use of technology in order to provide all the paratextual information on the objects shown, the "*Environment of the Artefacts*", as he calls it. And it's interesting also to note the scepticism of the Director of the Museum of the American Indian, which can be considered in two ways:

- the scepticism about the existence of a technology able to show something in

real time by pressing a button;

- the scepticism that by using technology, and showing a technological reconstruction of an environment, it would be the original environment.

If the second case is the correct interpretation of Dr. Dockstader's question, then this would open up the whole field of the authenticity of technological reproduction, and the use of technological reproduction in exhibitions: a question that was first put by Walter Benjamin (1936). I find the words of Christensen (2010), quoting Walsh highly appropriate here, as he shows how Walsh turns Walter Benjamin's concept of aura and mechanical reproduction upside down. When Benjamin claims that a reproduction of a work of art is without the original's aura, it is Walsh's claim (Walsh in Cameron and Kenderdin, 2007: 29) that photography in conjunction with the museum institution affects and changes the aura of the original. The more a work of art is reproduced photographically, and the more it is printed on postcards, on posters, in art books, and one may add on the websites of museums as their highlights, the more aura the original work of art acquires, and the more it is appreciated by the audience. Walsh's argumentation is in a way a reduction of Benjamin's concept of aura. It is Benjamin's crucial point that the effect of aura is created by the place of the work of art in a historical tradition, and that it carries traces of this tradition in, e.g., its age, patina, and provenance, whereas Peter Walsh concentrates on its uniqueness and originality: there is only one single instance of it. However, it is tradition and patina that today can create a sense of aura, as when one is holding an actual 'original' Boydell engraving in one's own hands. It is the relationship between the original and the mass-produced that Walsh focuses on in his discussion with Benjamin when he writes:

It is […] the reproduction that confers status and importance on the original. The

> *more reproduced an artwork is – and the more mechanical and impersonal the reproductions – the more important the original becomes.* (Walsh in Cameron and Kenderdin, 2007: 29; Christensen, 2010: 5)

It is useful here to refer to Daniele Jalla, who notes that what distinguishes expert visitors from other visitors is their mastery of textual codes, in the way that they are capable of understanding structure and form, rhythm and poetics along with the message. Whereas in formal and informal education, museologists are provided with many tools for the interpretation of literary and musical and to some extent visual codes, it is extremely rare to be provided with an explanation of the existence and operation of museum communication, a subject taught and studied only the top level and as part of the training of museum staff (Jalla in Gennaro, 2007: 14-15).

In contrast, education in museums, in their forms and codes of communication, should form part of universal education, not only because everyone is likely to visit a museum at least once in a lifetime, but also as part of a more general education in the reading of space or at the very least as a preliminary to understanding the role that space plays in our lives. And an understanding of the language of space would in many cases be almost sufficient to start to understand a museum, by applying to it the ability to read the city in which we live, the landscapes we cross and which constitute the framework within which we spend our lives, the constraints and conditionings to our movement, both physical and non-physical; an important skill that is often not sufficiently transmitted.

This reflection is so much more important if we extend the discussion from museums to cultural heritage, the understanding of which passes through the basic skill represented by the ability to decipher the signs of urban and rural landscapes, built and ‘natural’, to the extent that it is difficult to think of an education in cultural heritage that does not

also provide an education in reading space both in and for itself. In passing McLuhan provides the example of the Museum of Childhood in Edinburgh with its witty labels that are both informative and humorous (McLuhan, Parker and Barzun, 1969: 59).

However, regardless of the field, however large the communication code of a museum, Jalla thinks that the central problem remains that of the message that the museum seeks to communicate and how it is communicated. That is to say, the way that forms that are not only the values present in things, but also those present in the mission of a museum, become perceptible as messages within a structured text (Jalla in Gennaro, 2007: 15).

A text that is necessarily multimedia insofar as it uses a plurality of means of expression: from the language of things to that of written texts, from the language of light and colour to that of space. And, in the same way, it is a structurally interactive text to the extent that the museum text, through the very fact of being inscribed within a space open to being traversed independently by visitors, offering more room for the freedom of the path of a written, musical or cinematographic text, makes it possible to move inside selecting and performing movements back and forth, in part interacting in a manner independent of the text itself.

It is starting with these features of the museum that the questions of surprise, amazement or wonder can be addressed, to return to these concepts that have been explained previously. And in the following section I will explain the concepts of ‘space’ and ‘place’ in relation of museums and virtual museums, using important theories about the ‘local’, ‘global’, and the ‘glocal’.

2.10 Sense of space and place

> *As an entree for the whole problem for the museologists or the curators might it not be useful to point out that the museum as a retrieval system for classified objects is not going to be acceptable very long. People now feel the need to have a sense of the total surround of these objects and the total environment that produced them. And the sort of culture that produced them. They like to see them in their setting in the sort of form in which they originally existed, and, as it were, in action.* (McLuhan, Parker and Barzun, 1969)

Alessandra Mottola Molfino (2010) in Italia Nostra magazine[40] notes that the approximately 5 thousand museums in Italy are now the most widely distributed cultural institution in the country. For this reason, she defines Italy is known as "*a nationwide museum*" (McLuhan, Parker and Barzun, 1969).

Their role is to be a resource of identity, and she quotes the great anthropologist Ernesto de Martino: "*[...] at the basis of the cultural life of our time is the need to remember a homeland, and to mediate the reality of this experience through one's own relationship with the world*" (DeMartino, 1975). Italian cultural future can be safeguarded by local museums; without them and the call to identity they make for all of us, we would all be defenceless against the challenges of globalization. Italy for her must cultivate its own original model, that of the 'nationwide museum' and the 'genus loci'.

In relation to the theory described by Aldo Rossi (1978) and then by Christian Norberg-Shultz (1979) pointing out the relationship between architecture and territoriality through the study of Rome, Khartoum and Prague, she says that we must offer 'our' model with pride, different from the universal and imperial 1 museums of the 19th Century; the gigantic museums created by the will of governments up to World War I, from Berlin to London, from St. Petersburg to Vienna, Paris and Brussels. In the age of global culture it is no longer necessary to make collections in a few centres of

[40] http://www.italianostra.org/?page_id=82. Retrieved on 01-06-2014

knowledge in the capital cities, great libraries and encyclopaedic museums, this task is now carried out by networks of electronic information that can deliver all the world's knowledge to any home. It has become essential to recognize (and deepen) the cultural diversity and specificity of individual countries, and even small cultural histories: to present the cultural objects belonging to them in the places, contexts, landscapes where they were born. Aldo Rossi explains his theory of the decline of museums better in conversation with Patrizia Montini Zimolo, Virgilio Vercelloni and Marco Brandolisio (Montini Zimolo, 1995: 43-48).

For Mottola Molfino museums fuel innovation and intellectual cooperation, enhance the attractiveness of the region and improve the quality of life. Museums are useful if they reinforce ties of identity, if they make a contribution to keeping communities alive, if they fight social fragmentation and dispersal, if they transmit new ideas and build new cultural references, if they support individuals in feeling part of a joint project of life and development. Right now these cultural institutions are necessary for social life, with the capacity to promote the participation and active intervention of citizens, both alone and collectively, in conservation as well as appreciation, carrying out economies of scale through forms of associated management, operating through a logic of networks and self-managed systems.

The central concept of this kind of museological theory is the capacity of museums to act in networks, to promote local systems – both local and virtual – and to exploit available knowledge as a contrasting factor in the face of the crisis.

The promotional projects of the Italian Ministry of Heritage and Cultural Activities

must be able to bring visitors back to museums (in) and not works (out), using the museum as an 'ATM' of masterpieces to be toured. Museums should receive sufficient financial and human resources so that they can carry out the essential role that society requires of them: institutions for cultural mediation, intercultural dialogue, social cohesion and the protection of territory. I must note that the Italian situation in Cultural Heritage Management is in real danger, with few future prospects, but do I hope that a real use of new technology can help Italy to escape the situation and avoid the risk of becoming Europe's theme park, with no home-grown Italian project for cultural management. Italia Nostra and ICOM Italia should avoid the construction of new large museum complexes, 'cash-guzzling boxes' and instead support 'local museums'. This is the thought behind ICOM's International General Conference in Italy, to be held in Milan in 2016, under the theme of 'Museums and Cultural Landscape'[41]. All ICOM Italy museum professionals are from now to 2016 employed in the development of projects stressing the Italian 'genius loci' in all the possible meanings of complex landscape, environment and culture of Italy.

Virtual museums alter the concept of place (Perlin in Mintz and Thomas, 1998: 83). This means that the contents of exhibitions can be *transported* to the place of the computer of the audience, or the contents of museum archives can be viewed by the public, or museum objects can be viewed by a wider public too. Perling states that "*Our perception of place – where an individual sees and learns about objects and our collections – is another aspect of the conceptual change being brought by interactive technology*" (Perlin in Mintz and Thomas: 85).

[41] http://icom.museum/activities/general-conference/icom-milan-2016/. Retrieved on 01-06-2014

It is also important to mention the difference between 'space' and 'place', and the *place* of interaction. As Ciolfi wrote,

> *On the theoretical side, it is the individual, social, cultural and physical aspects of human experience of space and place that have to be studied and understood in designing ubiquitous technology. This is necessary in order to shift the focus from the development of the system infrastructure on one side, and the analysis of users' activities on the other, to a more complex view of the users' experience as localised, inextricably linked with its physical surroundings by means of individual, social, cultural and structural/functional relationships between the two.* (Ciolfi, 2004: 5)

The space of the interaction, when the interaction occurs between groups or individuals, in an exhibition, becomes the *place* of the interaction, and in the main case of an exhibition or an experience in the field of heritage, interaction itself in the place between visitors *reconfigures* the exhibition (Ciolfi, 2004: 7) going beyond what is programmed, catalogued, digitally reconstructed, creating a place of dialogue between individuals, and between visitors and the cultural institute.

As for what has been said so far on the theories of Genius Loci in the museum, starting with the reality of the 'tangible' museum, it is obvious that the concept of Genius Loci also applies to digital space, following the reflections of Luigina Ciolfi who identifies digital spaces that can, often better than tangible models, embody the extended museum, as the point of interpretation and 'entrance' to the display of information on a single topic, embodying the reality of the 'genius loci' of a specific territory.

The aforementioned example from the late 1990s of 'Crivelli's extended museum' provided through a web interface information and locations of the works of the famous painter from the Marche, grasping the nature of his pictorial production, firmly anchored to the territory where he worked and that he loved deeply, acting as a 'centre of digital interpretation', a true virtual museum, containing, explaining, communicating,

and allowing the artworks scattered both throughout the Marche Region and around the world (United States, Great Britain, etc.) to be reached.

The concept of 'Glocal' in museum studies is linked to those topics and is familiar in social networks and Internet, concerning how a strictly localized reality (product or service) can become of international importance for a handful of interested people, and then become an instrument for sharing a common interest.

To sum up, the acceptance of the Internet has both benefited from and facilitated the social transformation of work and community, from groups in little boxes to glocalized, ramified social networks. Rather than being an isolated technical system, the Internet has become incorporated into everyday life and is increasing North Americans' stock of social capital.

> *As social systems change, the Internet changes in a feedback process. The relationship is less one of hard technological determinism than of soft 'social affordances' creating opportunities and constraints.* (Wellman, 2002: 5)

In these terms, thinking about the role of technology as a support for museum communication, and in particular the use of new technology, the museum itself can be a point of interpretation of similar realities, societies, groups and people.

In this field the studies of Manuel Castells' are of great significance. Castells states that "*the concept of the network society shifts the emphasis to organisational transformation […] unified by a common belief in the use value of sharing*" (Castells, 2005: 43). He stresses the importance of networks in human life and their structure and role within contemporary society. For him networks, "*constitute the fundamental pattern of life*" and are "*a set of interconnected nodes*". The culture of the global network society is a

culture of protocols of communication enabling communication between different cultures. Castells envisions a global network society as the emergence of interacting cultures "*unified in a common belief in the value of sharing*" (Castells 2000a; 2000b; 2004). Coping with the argument of museums, Castells argues that culture is "*produced materially through an articulation in space developed through time. […] What happens when time disintegrates and space is globalized?*" (Castells in Parry, 2010: 430). Castells defines museums as repositories of temporality (Castells in Parry, 2010: 431), according to Foucault's notion of heterochronia where the museum is 'the' case of heterochronia together with libraries (Foucault, 1984). Museums for Castells may emphasize the signs of identity outside the culture of a global elite and "*increase the cultural fragmentation of societies in this globalized world (leading to an opposition between network museums and museums of identity)*" (Castells in Parry, 2010: 432) becoming "*communication protocols between different identities*" connecting different temporalities into common synchrony and "*connecting the global and local dimensions of identity, space and local society*" (Castells in Parry, 2010: 433).

It is relevant to mention here the ideas of Bruno Latour on nature and society and the conjunction between the natural and the social in intersections involving the global and the local, giving them a significance in the mediation between those four realities.

Latour starts by considering the concepts of 'natural' and 'social', in relation to the terms 'local' and 'global' related to the networks, that are neither global nor local in themselves, but can be more or less wide. Latour takes the opposition between local, global, natural and social as a key in defining our 'modern' world: if social and natural cannot assimilate, the terms global and local are distinct. Through these intrinsic oppositions we can observe the error of the 'modern' world where these 4 distinct

realities are assimilated. Between this opposition there can be nothing different to networks or mediation of those realities, and there is everything that happens between those oppositions (Latour, 1995: 149).

Latour also wrote about museums, for instance examining the horse exhibit at the Natural History Museum of New York (Latour, 2007), the Iconoclash exhibition (Latour, 2002) and the social contributions of Veronese painting (Latour and Love, 2010). He also expressed interest in maps, topology and mapping exercises by architects and designers (Latour, 1990). Also relevant to this research are his contributions to the Actor-Network theory (Latour, 1987; 2005), as are his works and those of his assistant Tommaso Venturini in the so called 'Cartography of controversies' (Venturini, 2008) where 'both human' actors, but also unanimated entities such as theories, concepts, places, institutions and laws interact actively in the construction of significance in progression from his aforementioned research of 1991 with a direct relevance to this research work.

This work can be related to Deleuze and Guattari's theory of the rhizome (Deleuze and Guattari, 1987) that can be defined as a map, an informational code, but not a tracing.

> *What distinguishes the map from the tracing is that it is entirely oriented toward an experimentation in contact with the real. The map does not reproduce an unconscious closed contact with the real. The map does not reproduce an unconscious closed in upon itself; it constructs the unconscious. It fosters connections between fields, the removal of blockages on bodies without organs, the maximum opening of bodies without organs onto a plane of consistency. It is itself a part of the rhizome. The map is open and connectable in all of is dimensions; it is detachable, reversible, susceptible to constant modification.* (Deleuze, Guattari, 1987: 12)

This connects directly to Latour-Venturini's work on cartography work.

I would like to provide some examples to support this statement, starting with the

experience of Palazzo Madama in Turin. As we will see in the section about my Category F of Virtual Museum, the City of Turin is particularly attentive to new technology and visitors services. Ever since 2009 a knitting community has been meeting every week in Palazzo Madama in order to share experiences, knit together and exhibit their work (also collective). At the centre of this experience is the tam-tam Social Network starting from a blog, http://madamaknit.blogspot.it/, and the Palazzo Madama Twitter account, @palazzomadamato that helps people meet and share their experience in the Museum. In its 4th year, the knitting community found a huge sponsor, Cucirini Cantoni Coats, which became both sponsor of the knitting community and of the museum itself, creating a positive experience of supporting cultural activities in the field of heritage[42].

Museums must become centres for the interpretation of the reality of society and it seems to me that technology has an important role to play in this. I will highlight this concept in my description of *MuseoTorino* as a perfect example of my Category F of virtual museums.

In the following section I will try to give an answer to the question of whether the virtual museum can be considered a new medium, and if so what is its channel?

2.11 Is virtual museum a new medium?

After considering the issues concerning the museum as a medium with space as its channel, we must now focus on the virtual museum, and on the question of whether the virtual museum can be considered as a new medium.

[42] http://www.palazzomadamatorino.it/pagina3.php?id_pagina=668. Retrieved on 01-06-2014

I will return to the definition of the virtual museum I endorsed at the beginning of this work, as a "*museum without walls*" (Malraux, 1967: 75).

The concept of the museum without walls as an important idea for the genesis of the term, the concept and the idea of the virtual museum is undeniable. Museums have 'opened their walls' to the public at large, following Malraux's wishes, to millions of visitors that can now enjoy the most important works of art. Malraux's practice is particularly relevant today, when digital art collections as *Google Art Project*, Artstor[43], ArtFinder[44], and Artsy[45] have made the writer's dream of a browsable archive of Art History a reality. His curating of a cross-genre collection also brings social networks to mind.

And this could also be seen as a sort of history of the concept of the 'museum without walls', depending on the different editions of Malraux's text, especially the 1965 edition and the English translation of 1967. I will start by considering the first Malraux's master conceit addresses the pure conceptual space of the human faculties: imagination, cognition, judgement. In English however, it speaks of a place rendered physically, a space which we might walk through, a seeming paradox for many years. I quote as a reference all the works, books and papers going in the direction of providing an unambiguous, comprehensive definition of the virtual museum. Werner Schweibenz's aforementioned idea, starts from a definition of the museum that I cannot share, trying to arrive at a historical definition of the virtual museum that cannot be found in Mairesse (Mairesse and Desvallées, 2010: 58-59). He writes that the importance of objects was questioned in favour of the importance of information (Pearce, 1986),

[43] http://www.artstor.org/index.shtml. Retrieved on 01-06-2014
[44] https://www.artfinder.com. Retrieved on 01-06-2014
[45] http://artsy.net. Retrieved on 01-06-2014

arguing that scholars like Wilcomb E. Washburn suggested that the emphasis of museum work should be put on information rather than on objects (1984: 14f), others like George MacDonald and Stephan Alsford (Alsford, MacDonald and Phillips, 1989; Alsford and MacDonald, 1991; Alsford, 1991; MacDonald and Silverstone, 1992) described the museum as an information utility going as far as stating that museums need to think of information, rather than of material objects, as their basic resource (Alsford, 1991: 8). Finally museums were no longer thought of as being repositories of objects only but as "*storehouses of knowledge as well as storehouses of objects*" (Cannon-Brookes, 1992: 501; Hooper-Greenhill 1992: 3F; Schweibenz, 1998: 4).

Many references and supporters put the focus of this definition on the technological use of the virtual museum itself, cutting out the emotional field: wonder, contemplation, amusement that I have stressed so strongly in my definition of the museum (and of the virtual museum), according to Italian museology. However it is important not to lose sight of the big picture: the supporters of technology stress the technological potentiality of the virtual museum. Museologists try to figure out the relationship of the virtual museum with the museum-with-walls, but only a very few of them have even started to, consider the possibility of a real museum, even if without walls, such as *MuseoTorino* (mentioned in category F of Virtual Museum further in this research).

Bearman also states that museums provide an opportunity to interact with artefacts, specimens, and realia from beyond our everyday experience. Many artefacts are unique, remote, or difficult to perceive, and are therefore exhibited with interpretive text, images and sound, making the museum a multimedia experience. Since the early 20th century museums have strived to be more than 'cabinets of curiosities' to be viewed passively (Bearman, 1992: 1). And he continues by stating that the ultimate challenge is

to transport the interactive multimedia museum not just outside its walls, but to where there are no walls (Bearman, 1992: 2).

This endorses my theory of a 'diffused museum', intended as an evolution of the concept of 'Ecomuseum' referring to de Bary, Desvallées and Wasserman (1994) and Davis (1999).

The possibility of thinking about a different, technological kind of museum without walls comes from artists, designers and architects.

For example this was also the theme of the SIGGRAPH 1995 panel 'Museum without walls', working on certain experiences of the Ferrara Congress 'I progetti non realizzati di Palladio' ('Un-realized Palladio projects') at the Centro Internazionale di Studi di Architettura Andrea Palladio, in 1994[46]. The focus in Ferrara was on unrealized projects, on virtual architecture, the concept of the possibility, and (because it was 1994) the possibility to rebuild, thanks to technology, some of the projects that the great mind of Palladio had conceived but had never had the possibility to bring into existence.

Michael Naimark was at Ferrara and SIGGRAPH 1995 curating the panel that I mentioned before. In the panel the research question was: "*What role should computer graphics, multimedia, virtual reality, and networks play in the 'Museum of the Future' and what effects will these technologies have upon it?*" (Alonzo et al., 1995).

The question is new now, but at that time it was even newer. There were a lot of replies to this question such as the one that Naimark provided, where he stated that museums with walls will offer experiences very different from, but symbiotic with, museums without walls. As public spaces, new media can be used for unique immersive environments on a scale much larger than for homes, with high resolution, panoramic,

[46] Interview with Professor Marco Gaiani, of the University of Bologna, 31 January 2013.

stereoscopic visuals, and high quality multi-channel audio, haptic feedback, and novel input. Museums with walls will always collect and display original art and artefacts. Representations of such work, while convenient and economical, will never completely replace the originals. Museums of the future can take advantage of a powerful symbiosis by planning to be both a node on the global network and a place for unique sensory rich experiences (Naimark in Alonzo, 1995).

These sentences shed some light on the relationship between museums with and without walls, and are typical of early experiments. It focuses on relationships and not on the characteristics of museums without walls, on the real independence of a museum without walls from all other museums with walls, and how the 'authority' of the museum without walls is the same as all other museums with walls.

Naimark was incidentally part of the original design team for the MIT Media Laboratory in 1980 and was a founding member of the Atari Research Lab (1982), the Apple Multimedia Lab (1987), and Lucasfilm Interactive (now LucasArts, 1989). He joined Interval Research Corporation, a long-term lab funded by Paul Allen, when it opened in 1992. Naimark also made interactive 'moviemaps' of Aspen from the street (1978-80)[47] the picturesque mountain town in Colorado, known for two processes, relating to heritage and virtuality. One is to 'moviemap', the process of rigorously filming path and turn sequences to simulate interactive travel and to use as a spatial interface for a multimedia database. The other is to 'Aspenize', the process by which a fragile cultural ecosystem is disrupted by tourism and growth. (Naimark, 2006: 1). As stated before, this is a very interesting, pioneering experience, dating back to 1978: it goes in the direction of heritage marketing (of a highly rudimentary type), because "Its

[47] http://www.naimark.net/writing/aspen.html. Retrieved on 01-06-2014

goal was to create so immersive and realistic a 'first visit' that newcomers would literally feel at home, or that they had been there before" (Naimark, 2006: 1)[48] and can be defined as a milestone in similar projects. Naimark was also in charge of another project recalling the Google Maps street view function: a reconstruction of Paris from the sidewalk[49]. The 'Paris VideoPlan' (1986) was commissioned by the RATP (Paris Metro) to map the Madeleine district of Paris from the point-of-view of walking down the sidewalk. It was filmed with a stop-frame 35mm camera mounted on an electric cart, filming one frame every 2 meters. An encoder was attached to one of the cart's axles. Rather than filming all the turn possibilities at each intersection, a mime was employed to stand in each intersection and simply point in the possible turn directions. The idea was to substitute the perceptual continuity of actual match-cuts with cinematic continuity. The playback system was built in a kiosk and exhibited in the Madeleine Metro Station (Naimark, 1997: 1-2).

Naimark transferred to ZKM, creating another 'moviemap' for Karlsruhe and Vienna, in 1991, revisited in 2009. This work, realized in this special field of exhibition, in the words of its founder, Heinrich Klotz, who stated that

> *the task envisaged for the ZKM is the sounding out of the creative possibilities between the traditional arts and media technologies for the purpose of achieving innovative results. The objective is the enrichment of the arts, not their technical amputation. For this reason both traditional and media arts must compete with one another. At the ZKM either aspect – each for itself and with one another – are given a voice. The Bauhaus, founded in Weimar in 1919, may serve as a model.* (Behr, 2009)

It is important to note the relationship and the impact of the original French and English-translated edition of Malraux's work. In French, Malraux's master conceit addresses the purely conceptual space of the human faculties: imagination, cognition,

[48] And that disrupted Aspen itself with the 'Aspenization' process.

[49] http://www.naimark.net/projects/paris.html. Retrieved on 01-06-2014

judgement. Translated into English, it speaks of a place rendered physical, a space we might walk through, even of a museum without walls, that somewhat paradoxically can be traversed with difficulty, and I think this is the reason for the proliferation of 3D Museum reconstructions, as in Second Life (as mentioned in the sixth generation of Virtual Museums), or 3D architectural, or imaginary architectures that have occupied the thoughts and activity of a generation of competent multimedia architects, designers, exhibit designers, under the umbrella term of 'Virtual Museum'.

So, as a conclusion to this section, I can affirm that the museum as well as the virtual museum are both new media. For me it is now important to examine how technology, understood as communication technology or new media has changed the functions and the aims of virtual museums.

2.12 How technology affects museum aims

It is fundamental to understand the logic through which many virtual museum projects were understood by computer engineers in the past decade. I have noted in recent years of work in the field how the risk of distance between the thoughts and desires of museologists and those of the IT sector has become much more real. I believe that this has happened because of a lack of communication between the main functions of museums, and the fact that ICOM's definition of the museum is not as commonly shared as museologists would like to believe. The museum is also defined in dictionaries as:

> *a building in which objects of historical, scientific, artistic, or cultural interest are stored and exhibited. ORIGIN early 17th cent. (Denoting a university building, specifically one erected at Alexandria by Ptolemy Soter).* (Stevenson and Lindberg, 2010)

Thanks to digital representations, masterpieces have already come outside the walls, appearing in the web, in CD-ROMs, on smart-phones and tablets. In this paper, and in my work in general, I write about museums that use technology to store and exhibit their artefacts. As a consequence, a definition of museums that is relevant for 3D museum projects from the past was given by Andrews in 1996. A virtual museum is:

> *[…] a logically related collection of elements composed in a variety of media, and, because of its capacity to provide connectedness and the various points of access available, [it] lends itself to transcending traditional methods of communicating with the user; it has no real place or space, and dissemination of its contents are theoretically unbounded […]* (Andrews, and Schweibenz 1998; Teather, 1998)

So, the main difference between a museum and a virtual museum, perhaps a misinterpretation of Malraux, lies in the absence of the building, of the bricks and mortar. As a result, the main difference is the concept of space as I have noted in the previous part of my research. The idea of space changes from real space into virtual space, bringing on several consequences as I intend to explain further on. One interesting text about the relationship between 'tangible' and 'non-tangible' museums states:

> *Many of the philosophical discussions about the museum centre around the questions of definition and terms like 'traditional' and 'new' museums are part of the historical landscape. It has been an unproved axiom of museums that museums are at their essence unique institutions devoted to concrete objects, physical things, the material remains of the past.* (Proença et al., 1998)

Thus, Andrews' definition of virtual museums emphasizes the idea of a *collection* of material, and the relationship between the collection and the users that access this material from various points. This is the first point that I am going to consider.

Starting from the given definition of museums together with the definitions of Malraux and ICOM, as well my own, historically:

> *The main activity of museums is to present to a wide audience sets of objects that*

> *represent the cultural heritage of a particular region, time or people.* (Proença et al., 1998)

The stress in this definition is on the audience, because the purpose of the museum is to be accessible to the widest possible section of the interested population. What I find hard to agree with this definition is the fact that the verb is 'present', and museums are not provided with the chance to be a centre of interpretation, of social and cultural activity, that is to say, one of the most preeminent roles of the museums in recent museology. Museums have had to (and sometimes still do) deal with a great deal of communication problems including understanding social change, in order to stay up to date with the culture, knowledge and know-how of the wider community. Assuming that the main goal of a museum is to promote public access to its collections, then for years the main goal of virtual museums has been to increase the level of its awareness in relation to information technology. This goal must be attained by the museum staff thus enhancing the knowledge of the organization, in numerous cases using the services of external consultants, because of the lack of technological awareness among museum professionals. I will deal with this aspect in more depth in the last chapter of this research. This shift has affected the whole life of museums. As a consequence, for years the second goal of museums has been to create digital inventories of their collections in order to create the basis for national and international cultural heritage. The digitalization process was the natural choice, assuming the increase in IT skills in museum organization, and also because the database is useful for cataloguing purposes (IT awareness began further back in professional archives than in museums). As soon as museums started digitalizing their inventories, the third goal was then to promote the use of the Internet both as a communication tool, and as a public access tool for virtual visits to the collections (Teather, 1998).

So, as Teather wrote in 1998,

> *we must acknowledge that we have fundamentally inverted the definition of the museum, to one that is much more about human experience, about people as museum makers and as those who make meaning in museums. This is a person-centred model of the museum idea. This shift in emphasis acknowledges that museums are not set in time, but are still constantly being created and re-created.* (Teather, 1998)

This was a starting point for my research: new technology tended to put more stress on the experience of the user, than on the objects on display as was the case in the past. Let's consider some issues in this new approach.

After giving a definition of museums dealing with the past experiments of virtual museums, attention focused on users' experiences:

> *How can we make the facts of these objects sing to the virtual visitor? How can we enable them to have an experience? The first requirement for museums is to recognise that the networked environment is interactive, and therefore can be user driven. It enables us to respond to the visitor rather than pump information at him <sic>. If used to its best purposes, the networked environment enables a user to construct an experience with personal meaning.* (Borgatti et al., 2004)

For Bearman and Teather the answer lies in the metadating of museum objects by technology. We will go further in the examination of metadating in museum communication in the chapter devoted to the taxonomy of virtual museums, and exactly referring to my Category D of virtual museums. I will conclude this section about the museum as a medium by reporting 'remediation theory due to its great importance in considering museums and virtual museums as media.

2.13 Remediation

In their book Bolter and Grusin state that the World Wide Web favours ongoing remediation, that is the way new media – computer graphics, virtual reality, and the

World Wide Web – define and refashion old media – painting, photography, film, and TV. Their remediation theory is an aid in defining the virtual museum as a medium, in an augmented way therefore the museum is also a medium, and given the comments in the last chapter, remediation theory is a step ahead with respect to Manovich's theories where the web offers a constant promise of live interactivity through the flexibility of networked communication. This instantaneously engaging immediacy dictates the medium, created through the underlying contributing layers of media labelled hypermediacy in Bolter and Grusin's terminology. The web has become an increasingly salient remediator, a reconfigurer, of all sorts of information which is readily absorbed (Morbey, 2007: 5).

As I reported at the beginning of this research, a virtual museum is also intended as a museum website, or as a museum that exists only on-line. As I wrote, I am rather sceptical about this definition, because I see the virtual museum as real as its tangible counterpart. Morbey shows how with the advent of the vision and strategy of the new website, the Service Internet and the museological sector view the employment of the Internet as a cultural medium rather than as a financial tool, a way to explain what the museum and its artefacts are about culturally and historically. The outreach of the site is two-fold: global visitors and the French population. Two-thirds of those who visit the museum are foreign visitors, with one-third coming from within France. Since the majority of visitors are non-French, the Service Internet realizes a need to develop strategies to engage in a 'user-friendly' manner the dominate groupings of non-French visitors in their own languages (Morbey, 2007: 8).

This is a shift in intentions for virtual museums; I believe the years between 2007-2008 were the borders between an old and new ways of conceiving virtual museums, their

role and their relationship with their tangible counterparts.

2.14 Conclusions

The museum is a medium, and the virtual museum is a medium too. In order to arrive at this important point, I examined the thoughts of McLuhan, and of other important thinkers who, like the majority of researchers, were unaware of this important unpublished work by McLuhan.

The virtual museum is a medium as is its tangible counterpart. The channel has become cyberspace, the space where information is digitally stored and located to be used by human beings in the same way as they can walk down the corridors of tangible museums.

Malraux's definition that inspired so many early experiments means that the virtual museum is a medium just as much as the tangible museum. A museum without walls is still a museum, and given the essence of the museum as a medium, a museum that has no walls can be defined as a medium too.

I think that it is important to stress the *wonder* mission of museums, the capacity to inspire emotion in visitors in order to enhance their knowledge, and I would like to report here once again the phrase of Bacon recalled by Bettelheim "*Wonder is the seed whence knowledge is born*" (Bettelheim, 1990: 192).

In order to reach this objective museums must use every means at their disposal, and for this purpose technology can be helpful. However, bearing in mind the remarks of the authors of the London Charter, technology must be only a means, and not something that it is now impossible not to use.

Bearman states:

> *The ultimate challenge is to transport the interactive multimedia museum not just outside its walls, but where there are no walls. Katherine Woolsey and Robert Semper explore such extensions of multimedia into public spaces and identify the design problems that must be overcome to make such new realities effective. One issue we will certainly need to address is how to make interactive experiences meaningful for groups rather than only for individuals.* (Bearman, 1992: 2)

The museum has a specific role in society, and as we will see in the following chapters there are good and worse practices in helping society to understand its past, present and future; this could be another aim of museums. This quotation by Bearman indicates the role of virtual museums: outside the walls of museums, museums without walls (virtual museums) can help museums to be effective in society. In this chapter I have also investigated the concept of space, referring to museums and virtual museums, because space is the channel of the museum.

In the following chapter I will present the second contribution to new knowledge in this thesis, namely an attempt to build a taxonomy of virtual museums comprehensible for museum professionals.

III. Taxonomy of virtual museums

In my research into the taxonomy of virtual museums, I have been able to identify six different types of virtual museums (Caraceni, 2008). After publication in a peer reviewed book, I presented my taxonomy on several occasions (at 8 national and international conferences between 2009 and 2013)[50].

Following this process and the discussion of the first version of my research (see Appendix B) as part of the peer review requested after my first submission, I resubmitted my theory at the AVICOM General Conference at Rio de Janeiro in August 2013 and at the Musei Senesi Conference on the 26th September 2013, receiving the feedback reported in this chapter. After a methodological explanation, I will present my 6 categories of virtual museums together with examples of these practices, describing at least one in depth for each category, when useful.

In this chapter I provide a methodological explanation as to how my taxonomy was originally formed, and how it changed after the peer review. This is followed by the complete version of the taxonomy and a description of each category, with different examples that will provide museum professionals with an idea of past, present and future experimentation taking place in the field.

[50] 'Lectio Magistralis', department of Architecture, Università degli Studi di Palermo, 7 June 2011; 'Lectio Magistrali on Social Media e Patrimonio Culturale', Polimoda di Firenze, 16 September 2011; 'Contaminazioni digitali per la cultura: transmedialità, app, 3D, cinema e videogiochi', conference for *network V-Must*, CINECA, 3 October 2011; 'Social Museum', conference for *Seminario residenziale MuseImpresa*, Parma, 30 September 2011; 'Consciousness Reframed 2011 – Presence in the mindfield: CR12 Planetary Collegium', Centro Cultural de Belem, Lisbona, 30 November 2011; 'Augmented Heritage', *Impronta (del) Digitale 1.0, La classe dell'Arte*, Centro Trevi, Bolzano, 1st December 2011; 'Augmented Heritage: Some Thoughts on Museum Professionals', *Montreal Opening conference for AVICOM General Conference*, Montreal, 10 October 2012.

After this presentation, I will then provide a comparison between two very different examples of virtual museums, chosen because of their diversity in order to prove the validity of my meta-model.

3.1 Methodological explanation

As it was already anticipated in the methodological introduction to this work, my taxonomy has its origin in 9 years of observation of the phenomenon of virtual museums. At the beginning of my research I started keeping a 'catalogue', first as a file, and then as table of data, where I saved any examples of virtual museums I found in order to go deeper into my studies. These examples could be suggestions, or findings in my professional activity, or suggestions by non-museologists.

Given the definitions of 'emerging technologies' that was mentioned in the first chapter, it is easy to see that the examples I had started to compile during the first years of my research gradually become obsolete, or unrepresentative of a museological point of view, representing only 'evidence of technological prowess', without any real individual thought or museological paradigm behind the technological experimentation. However in the last years of my research, the supports of the majority of virtual museums that I had collected could no longer be read by the modern operating systems in use for the past two years, having been 'optimized' for Windows 98, or 2000, or no longer being supported QuickTime, or even being produced with older versions of Director that do not open anymore.

Another proportion of the virtual museums surveyed in my catalogue, those with a web presence, were no longer 'there', either the domain had not been renewed, or that part of

the museum's website had been 'removed' from the display.

A wonderful tool that I used in order to retrieve the most significant cases of virtual museums on the web was the Internet Archive, also present as a paradoxical case of the virtual museum itself. However in some cases research on the Internet Archive did not produce any results.

As for the origin of my discourse, as I pointed out in the introduction to this work, I had confirmation of the fact that a virtual museum must be built to last, in the same way as the real museum, as is clear from my definition of the virtual museum.

The wide-ranging taxonomy presented in this chapter comes from the greater and growing awareness of museology that I acquired during my years of studies and activities within ICOM and AVICOM. Due to the fact that outside the strictly museological context there has been, and still is, a great deal of confusion about the meaning of the term 'virtual museum' in the field of the humanities, not counting those coming strictly from a specific field of museum studies. A virtual museum may be an archive for example, while technicians often confuse advanced displays of historical data in 3D, and what constitutes the meaning of a museum, concerning the preservation, exhibition communication of relevant material for society as a whole.

Since the approach of my studies is multidisciplinary, I started including all the examples that were submitted or that I came across in my 'catalogue', then gradually thinning down the list. My heightened awareness as a result of my membership of the international community of museum professionals allowed me to skim between examples completely unrelated to museums, and examples of the new museology using technology.

So at the end of the years of research my taxonomy has its origin in two different suggestions. The first one comes from Michel Foucault and the 3 methodological principles[51] he set out in his 'History of Madness', and used in his research in this discipline. These principles seemed useful for me to organize my own research toward a definition of the different categories of virtual museum. These three principles are better explained in Maurice Florance's entry on Michel Foucault in the 'Dictionnaire Filosofique' (Huisman et al., 1984: 942-944)[52].

> *Taking the question of relations between the subject and truth as the guiding thread for all these analyses implies certain choices of method. First, a systematic scepticism toward all anthropological universals-which does not mean rejecting them all from the start, outright and once and for all, but that nothing of that order must be accepted that is not strictly indispensable. […] So the first rule of method in for this kind of work is this: insofar as possible, circumvent the anthropological universals […] in order to examine them as historical constructs.* (Florance in Huisman et al., 1984: 943)

This suggestion situated in Foucault will be articulated in my research. In his study on madness he focusses on anthropological universals. My research focuses on another field then Foucault's, but as has been seen in the first chapter, I have tried to give my own definition of virtual museums, referring to the definitions of other researchers and professionals but also trying to go forward through the observation of the examples of virtual museums that I encountered in my research work. In fact it is at this point that I found my main convergence with Foucault's methodology.

> *On the contrary, it is a matter of proceeding back down to the study of the concrete practices by which the subject is constituted in the immanence of a domain of knowledge. […] Hence a third principle of method: address 'practices' as a domain of analysis, approach the study from the angle of what 'was done'… These are the 'practices', understood as a way of acting and thinking at once, that provide the intelligibility key for the correlative constitution of the subject and the object.* (Florance in Huisman et al., 1984: 943)

[51] M-Node of Planetary Collegium organized in 2011 a seminal seminar on Michel Foucault, by Antonio Caronia and Amos Bianchi, on 'Michel Foucault, per una genealogia del soggetto'. In this seminar the stress was on defining the subject, with a lot of deepening in Foucault thought using 'History of Madness' and 'Archaeology of Knowledge'.

[52] It is public knowledge that the entry was written by Foucault himself.

As I have stated before, I have witnessed so many very different practices of virtual museums in this project (as defined by other academics, researchers and museum professionals) that I was confused at not finding a broader definition to cover all the different cases emerging over the years. On the other hand, in parallel to the process of tracing the contours of this broader definition (as explained in the first chapter), I also felt the need to group these experiences together, finding out recurrences and differences[53].

Therefore, the following taxonomy comes from the morphological observation of known cases of virtual museums. After putting the different experimentations into groups, I decided to describe in depth one example from each group for every category. These examples define the variability of the field of study of this research into virtual museums, where so many different and heterogeneous cases being described as virtual museums.

I am aware of the existence of other paradigmatical virtual museums that I have not considered, and in this direction I decided to ask my AVICOM peers for feedback at the conferences where I presented my taxonomy (these results will be resumed and analysed in the following chapter); here lies the second methodological influence in my study. Based on Popper's refutation of the idea of positive verification and proposition

[53] Coming back to Foucault's ideas on taxonomy. The start of his book 'The order of things' (1970: XV) is remarkable: "*This book first arose out of a passage in [Jorge Luis] Borges, out of the laughter that shattered, as I read the passage, all the familiar landmarks of my thought—our thought that bears the stamp of our age and our geography—breaking up all the ordered surfaces and all the planes with which we are accustomed to tame the wild profusion of existing things, and continuing long afterwards to disturb and threaten with collapse our age-old distinction between the Same and the Other. This passage quotes a 'certain Chinese encyclopaedia' in which it is written that 'animals are divided into: (a) belonging to the Emperor, (b) embalmed, (c) tame, (d) suckling pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camelhair brush, (l) et cetera, (m) having just broken the water pitcher, (n) that from a long way off look like flies'. In the wonderment of this taxonomy, the thing we apprehend in one great leap, the thing that, by means of the fable, is demonstrated as the exotic charm of another system of thought, is the limitation of our own, the stark impossibility of thinking that*".

of negative verification (falsification) in its place (Popper, 1959), I also consider Lakatos' critique of this theory, going beyond Nature's rebellion against a theory that aims to describe it: for Lakatos this incoherence can be resolved without modifying the theory itself, giving rise to auxiliary hypotheses however (Lakatos and Musgrave, 1970). While grouping spontaneously the examples of virtual museums I was coming across in my research, I asked myself: is there a meta-method to classify the world's entities, the diversities of what we feel as manifestations of the same wider phenomenon (mammals, stones, asteroids, virtual museums)? Ereshefsky (Ereshefsky and Ruse, 2000) defines "*the philosophy of classification*" as interdisciplinary crossing of philosophy and biology, classification in science posing the question of how scientific classification should be constructed. He presented three general philosophical schools for taxonomy: essentialism, cluster analysis, and historical classification.

> *Essentialism sorts entities according to their essential natures. Cluster analysis divides entities into groups whose members share a cluster of similar traits, though none of those traits are essential. The historical approach classifies entities according to their causal relations rather than their intrinsic qualitative features.* (Ereshefsky and Ruse, 2000)

According to this definition, my taxonomy came from the observation of the practices of virtual museums, grouping those with similar traits together. Five years ago when I first presented a draft of this taxonomy in a peer reviewed publication and at an international conference my aim was to place these categories in a historical pattern in an attempt to order the phenomena of virtual museums all over the world chronologically. I have now observed that all of these categories, including the less advanced, have been or are presently in use in recent projects; therefore I have decided to abandon the chronological timeline for a taxonomy of virtual museums that includes contemporary, recent and older projects in the same category.

As was stated in the previous chapter about a methodological explanation, this taxonomy comes from the observation of the known and recognized cases of virtual museums as defined by the academic and museum professional community. It is related to my definition of virtual museums and with other definitions of virtual museums.

The starting point for constructing this taxonomy was the aim to reach other existing taxonomies of virtual museums. I was able to find two different taxonomies of virtual museums. Schweibenz shows how virtual museums have been 'under construction' for some ten years now, so that the virtual museum still lacks a generally accepted definition and even an established term to designate it, being known as on-line museum, electronic museum, hypermuseum, digital museum, cybermuseum or a Web museum depending on the backgrounds of the practitioners and researchers working in the field. Regardless of the name, the idea behind this phenomenon is to build a digital extension of the museum on the Internet, a museum without walls. He goes on to provide examples of the following categories of museum, on the Internet (Schweibenz, 2004: 1):

- the brochure museum: a web site containing basic information about the museum, such as types of collection, contact details, etc. Its goal is to inform potential visitors about the museum;
- the content museum: a website presenting the museum's collections and inviting the virtual visitor to explore them online. The content is presented in an object-oriented way and is basically identical with the collection database. It is more useful for experts than for laymen because the content is not didactically enhanced. The goal of this type of museum is to provide a detailed portrayal of the collections of the museum;

- the learning museum: a web site offering different points of access for virtual visitors, according to their age, background and knowledge. The information is presented in a context-oriented way instead of being object-oriented. Moreover, the site is didactically enhanced and linked to additional information that motivates the virtual visitor to learn more about a subject they are interested in and to revisit the site. The goal of the learning museum is to make the virtual visitor come back and establish a personal relationship with the online-collection. Ideally, the virtual visitor will come to the museum to see the real objects;
- the virtual museum: the next step on from the learning museum is to provide not only information about the institution's collection but to link to digital collections of others. In this way, digital collections are created which have no counterparts in the real world. This is the implementation of André Malraux's vision of the 'museum without walls'.

This taxonomy, even if comes from an official ICOM document (ICOM Newsletter, 2004), does not satisfy me for two reasons. The document was written nine years ago. In 9 years there have been different types of experiments and certain examples of virtual museum simply cannot be placed into these four categories.

I could go further into the taxonomy of virtual museums, but now I would like to mention the second taxonomy that I discovered, coming from the V-Must Network, the network of excellence for virtual museums[54].

In their project, an attempt has been made to categorize virtual museums[55]. One of the

[54] http://www.v-must.net. Retrieved on 01-06-2014
[55] http://www.v-must.net/virtual-museums/categories. Retrieved on 01-06-2014

main reasons I have chosen to make no reference to this is because its general focus is on information technology using terms and concepts that are not easily understood by typical museum professionals.

However, the virtual museums mentioned in their website[56] tend to be limited to 'older' (to my way of thinking) examples: the majority are only 3D reconstructions. I would like to take a wider view, because I believe that a website can also be considered a virtual museum, as I will explain further on.

VMust's categorization of virtual museums was completed in January 2014 and was published later than this date, so it was only considered in the peer review of my taxonomy as reported in the devoted chapter.

Because their work was going at the same time of my research, it was difficult to tend to use their taxonomy as a model or a reference for my research work. It is possible to see a previous version of V-Must taxonomy in Appendix 2, and the reasons because I tended not to refer to it at all, because it was only a work in progress categorization.

After observing the first draft of my taxonomy, it emerged that some groups have most examples at certain historical periods, so in the first draft of my taxonomy I talked about the different groups using the term 'generations'. Following the history of multimedia and interactivity, as considered in Chapter 1, it is a fact that certain practices are older than others, because social networks were created after hyper-textual links, forums or the possibility of building 3D reconstructions; however having observed the first draft of my taxonomy it emerged that some practices are still used as valid examples of virtual museums, so, as I also explained in the first draft of my taxonomy, it is not

[56] http://www.v-must.net/virtual-museums/all. Retrieved on 01-06-2014

useful for them to be considered as historical groupings. Therefore to avoid misunderstanding I have avoided the use of the term 'generation' in the second draft of my taxonomy. This taxonomy is not chronological.

In my opinion this taxonomy must be considered as a first attempt for the classification of the practices in the field (virtual museums); any other similar classification model coming in the future may confirm or refute my thesis[57], in the two years that I will take into consideration before reviewing my meta-model.

For each category I have drawn up a scheme whereby I describe the main quality of the group of virtual museum to which I consider it to belong, using as a basis the museum's communication need that this category has the aim to enhance. This main quality will also be employed as the 'title' used discursively to refer to the category instead the letter of classification (such as A, B, C, D, E, F).

The taxonomy is ruled by the needs of the museum for communication, as one of the main aims of the museum as defined by ICOM, and obeys the logic that the community of museologists have their main point of confluence in AVICOM and ICOM and I will therefore adopt and employ this taxonomy.

A key reference for me in establishing the needs of museums that can be satisfied by technology was the Horizon report 2010 (Johnson et al., 2010). Because this research work has museum professionals as its primary target, and the way technology can be understood and used for the communication of their museum's heritage, this taxonomy

[57] My theory has been presented, before and after the Viva examination, in conferences and papers, and to have feedback from a relevant number of AVICOM members, as described in a below chapter.

is centred on the enhancement of the museums' communication requirements, namely:

- Education and interpretation;
- Exhibition and collections;
- Communication and marketing.

Each category of my taxonomy must respond to the need that museum professionals wish to be enhanced. I decided to split up and isolate a number of terms, in order to make them more 'precise', in terms of what the virtual museum can be, and useful for museum professionals' comprehension of the topic. It is obvious that the categories can respond to other museum needs, but they should be considered as a response to the main needs of the museum in the three main museum functions as highlighted by the Horizon report. The implications will be examined for each category in the following sections.

On taking into consideration the observation in Chapter 2 about space, that is to say the medium of museums, the modality of browsing the cyberspace of virtual museums has also been considered in my taxonomy. In fact it is not useful in this attempt of classification to use 'objects' (even virtual objects) within the virtual museum itself for a first classification in describing them[58]. Another categorization of museums is based on education theory consisting of theories of knowledge and learning (Hein, 1999). On making an intersection between the theory of knowledge and the theory of learning Hein built a four quadrant scheme that can be used to classify museums by their educational positions: systematic museums, discovery museums, orderly museums and constructivist museums. Another categorization, more focused on user experience, emerges from the difference between dynamic museums in experience and museums

[58] UNESCO and ICOM classification of museum, 1985 and previously 1968.

static in experience (Dirsehan and Yalçin, 2011: 82)[59].

My first term of classification is more similar to the work of architects, aiming to divide museums into architectural typologies, and in the investigation of how the morphology of space can determine visitor experience (Marotta, 2013; Giebelhausen, 2003; Macleod, 2005). Classifications different to mine are often historicist but can support my initial attempt to provide my taxonomy with a declination in 'generations', due to the fact that an older, morphological model of museum may also be replicated in the future, having a similar result in visitor experience.

As a conclusion to this section, this classification is to be considered as a meta-model that is possible in the 'here and now'. Beryl Graham, aiming to provide a taxonomy of digital art, quotes Christiane Paul (2007: 4) who states that while taxonomies and categorization may be useful in identifying certain characteristics of a medium, they can also be dangerous applied in art, and especially digital art, because they are constantly evolving (Graham in Cameron and Kenderdin, 2007: 98). My thesis covers a period of 8 years' study into a subject that is constantly evolving. I must also point out that this research and taxonomy, intended as a meta-model produced in the last part of my research work, localized in time (2013-2014) is intended to describe the present and make certain predictions for the near future. The developments of computer science and communication paradigms in the future are unpredictable. My meta-model aims to give a picture of the state of the art 'here and now' in the past and present, which with further studies may be last for some time, or be contradicted.

As reports such Horizon, or LEM museum suggest, technology is developing extremely fast, so further studies will be needed in order to upgrade my taxonomy, perhaps on a

[59] This study does not go in deep cathegorizing museum, or in a deeper analysis of visitor experience.

regular two-year review basis.

3.2 Six categories of virtual museums (version 2.0)

In my research into the taxonomy of virtual museums, I have been able to identify six different categories of virtual museums (Caraceni, 2008), responding to the needs of museums for the communication of heritage, that are not seen as focussed on information technology. For each need I have tried to make a suggestion, from the observation of the 'virtual museum' phenomenon during my years of research, for the adoption and application of communication paradigms in museums in order to satisfy their needs. By the observation of known examples, I have described the technology used in the past and present in each category. I then define the relationship between virtual and real, and provide an observation of what visitor experience may involve in that particular virtual museum category.

In my work, through the analysis of examples of virtual museum, I have followed a process whereby those (the most important are listed for each category) museums presenting similar features in browsing the space of the virtual museum were grouped together, so that the category emerged after an observation-grouping action. The main feature that made me group specific examples together is described, as is any evident dissimilarity present within the same group, as well as unpredictable exceptions.

This categorization is functional with my research objective.

I aim to provide an example of each category with case studies explained in the following paragraphs. The meta-framework that I use is this:

CATEGORY	NEED TO BE ENHANCED	INTERACTION (open/closed)	SPACE (open/closed)	CONTENT	VIRTUAL/ REAL	VISITOR CONTRIBUTIONS (allowed/not allowed)
A	MARKETING	Open	Closed	Selected objects	Virtual on real, virtual with real	Not allowed
B	EDUCATION	Closed	Closed	Selected objects	Virtual on real	Not allowed
C	EXHIBITION	Open	Closed	Selected objects	Real with virtual	Not allowed
D	COLLECTIONS	Open	Open	All collection	Virtual with real	Not allowed/Allowed (*)
E	INTERPRETATION	Open	Open	Selected works/ all collection	Virtual with virtual	Allowed
F	EXPERIMENTATION/ COMPLEX MUSEUM IDENTITIES	Open	Open	Selected works/ all collection	Virtual with real	Allowed

Table 2. Metaframework of categories

(*)The presence of both options will be clarified in the description of this category

In this scheme, the six categories are to be considered in this syntax, to be known as the 'title', or a quick description of the virtual museum category, that will also be indicated in the description as 'model':

A. Virtual museum enhancing museum MARKETING with OPEN INTERACTION in a CLOSED SPACE showing SELECTED OBJECTS from the museum collection, NOT allowing visitor CONTRIBUTIONS.

B. Virtual museum enhancing museum EDUCATION with CLOSED INTERACTION in a CLOSED SPACE showing SELECTED OBJECTS from the museum collection, NOT allowing visitor CONTRIBUTIONS.

C. Virtual museum enhancing museum EXHIBITIONS with OPEN INTERACTION in a CLOSED SPACE showing SELECTED OBJECTS from the museum collection, NOT allowing visitor CONTRIBUTIONS.

D. Virtual museum enhancing museum COLLECTIONS with OPEN INTERACTION in an OPEN SPACE showing ALL OBJECTS from the museum collection, ALLOWING or NOT allowing visitor CONTRIBUTIONS.

E. Virtual museum that enhances museum objects INTERPRETATION with OPEN INTERACTION in an OPEN SPACE showing SELECTED or ALL OBJECTS from the museum collection, ALLOWING visitor CONTRIBUTIONS.

F. Virtual museum performing EXPERIMENTATION of NEW MUSEOLOGICAL MODELS with OPEN INTERACTION in an OPEN SPACE showing SELECTED or ALL OBJECTS from the museum collection, ALLOWING visitor CONTRIBUTIONS.

Examples will be presented for each category in another grid that will describe the technology, the content, the virtual/real relationship, and the user experience in relation to the aforementioned models.

Describing some examples for each category, I will use a similar but different grid such as the following:

(Communication) NEED (of the museum to be enhanced)	EXAMPLE	TECHNOLOGY	CONTENT	VIRTUAL/ REAL	VISITOR EXPERIENCE

Table 3. Example grid

It can be seen that each category has one or more examples, used to describe the category itself. All of these have been taken from my observation of the experiments, paying particular attention to examples that may be useful for museum professionals to understand a particular category. They have also been chosen for their inner diversity, such as the examples that I have chosen to prove the correctness of my taxonomy, in order to provide museum professionals with a deeper knowledge of the phenomenology of the virtual museum concept, so that it can then be applied in their work.

Here are some explanations of the fields that have been completed in the tables, both for the categories and for the examples (that are different so that museum professionals can understand better the main qualities of the categorizations and the examples).

In the **needs** column I have defined the particular need of the museum that can be enhanced by technology can enhance. It also contains a remark covering the needs as reported by the Horizon report, for example education and interpretation, and not considering ‘communication’ in the ‘communication and marketing’ section; this is

because communication is a specific aim of museums, the use of the term 'communication', often seems to correspond to the marketing function. I have also added the 'experimental' category, in order to respond to the need of experimentation for those brave museologists wishing to experiment new museological paradigms through technology.

For the '**EXAMPLE**' field in the description of the single examples, I have united the 'INTERACTION' and 'SPACE' fields. Describing the examples I have used a paradigmatical description of the main feature based on the nature of the example of the category itself, and the observation of past and present examples, as a suggestion for the communication needs of the museum in order to provide a virtual museum solution.

'**SPACE**': this is based on the observation of the browsing pattern of the 'space' of the virtual museum itself. For example: is it a closed or an open environment? Is it interactive or is it guided? Is it browsable only by an internet browser (or by a similar interface or CD-ROM), or does it involve a bodily interaction in a gallery or in a room? Can it be modified by visitor actions or not? This field is more focused on the visitor experience, on what he or she is supposed to do in the environment of the museum, but described in terms that can be understood by museum professionals, the target of my research, not in terms of interaction design, information technology, as is the case of the V-Must network's taxonomy among others. My experience as coordinator of ICOM Italy's thematic commission on audio-visual and new technology and in AVICOM from 2007 to date has provided me with knowledge of the problems faced by museum professionals regarding the use of technology; they require a new lexicon in order to understand the technology and the phenomenon of the virtual museum.

More specifically, with '**interaction**' I mean here to cover the question of whether there are closed or open patterns for virtual visitors approaching the virtual objects in the virtual museum, or if they can be chosen. More specifically with the term '**Space**' I have tried to describe the virtual space of virtual museums, understood as the space where interaction takes place, where the virtual visitor meets the virtual museum. This space can be open or closed, depending on whether it allows a pattern, a strong visit pattern to emerge and whether the visitor is allowed to begin the visit from the resource that she/he likes, and end it where she/he wants. It also defines whether the visit will still make sense if there is any omission in the pattern by the virtual visitor, or not. This field is related to the fields of 'technology', the 'content' and the 'interaction'.

With '**Technology**' (a column that will be used to describe the examples), the aim is to provide a brief description of the main technology linking the examples observed in this category. This is not a mere description of the technology, as could be expected in the Computer Science field, but of the means that the visitor-users have at their disposal for browsing contents in a virtual environment. I do not intend to go into the technological choices used to reproduce an image in depth (jpg, as opposed to other bitmap formats; different format of database, HTML or Flash or use of director, description of sensors and others). This field must be considered, as in a digital humanities discipline[60], to be

[60] As described in the 'Manifesto for the Digital Humanities' (http://f.hypotheses.org/wp-content/blogs.dir/171/files/2010/07/Pages-de-Aff_Dh40x60-EN2BIS.pdf):

1. Society's digital turn changes and calls into question the conditions of knowledge production and distribution.
2. For us, the digital humanities concern the totality of the social sciences and humanities. The digital humanities are not *tabula rasa*. On the contrary, they rely on all the paradigms, *savoir-faire* and knowledge specific to these disciplines, while mobilizing the tools and unique perspectives enabled by digital technology.
3. The digital humanities designate a 'transdiscipline', embodying all the methods, systems and heuristic perspectives linked to the digital within the fields of humanities and the social sciences.
4. We observe:

comprehensible both by museum professionals (as is the main goal of this thesis), and technology experts, without technical or other inappropriate terminology. For the valorisation of this field I used the categorization made by OTEBAC, the Italian Ministry of Culture's Technological Observatory for Cultural Assets for the benchmarking of virtual exhibitions. I will refer to the presence, in known cases, of the technology appearing on this list, mostly in the examples I have presented for each category. The genesis of this categorization is to be found in OTEBAC's work in creating guidelines for online exhibitions. These may seem fragmentary and inaccurate, but even so were put together by a community of museum professionals. Within the '**Content**' (column that will be used to describe the examples) I will not provide a description of the objects contained in the museum itself (art, pictures, paintings, science experiments, coins, …), but will instead describe the digital objects contained within the virtual museum that can be touched 'digitally' by user-visitors. Special importance will be given to whether the objects are reproductions of real objects, present in a brick and mortar museum, or whether they are digital objects created for a digital context. In the description of the category, this column will be used to define whether or not the objects shown by the virtual museum are part of a collection of items, also on display in exhibitions.

Within the '**VIRTUAL/REAL**' section, I refer to the work of a group of researchers

- that experiments in the digital domain of the social sciences and humanities have multiplied in the last half century. What have emerged most recently are centers for digital humanities – which at the moment are themselves only prototypes or areas of application specific to the approach of digital humanities;
- that computational and digital approaches have greater technical, and therefore economic, research constraints; that these constraints provide an opportunity to foster collaborative work;
- that while a certain number of proven methods exist, they are not equally known or shared;
- that there are many communities deriving from shared interests in practices, tools, and various interdisciplinary goals – encoding textual sources, geographic information systems, lexicometry, digitization of cultural, scientific and technical heritage, web cartography, datamining, 3D, oral archives, digital arts and hypermedia literatures, etc. – and that these communities are converging to form the field of digital humanities.

investigating the idea of the virtual museum in a project of Palladio Museum in Vicenza (Beltramini and Gaiani, 2012: 60).

The part of this research that was aimed at the construction of the new Palladio Museum in Vicenza contained a grid to define the relationship between the virtual and the real in the virtual museum. 5 different categories were defined with 5 different intersections of the virtual and the real in museums:

1. **Real with real**: identified with the traditional museum. Real objects are shown in a real space.
2. **Real with virtual**: this corresponds to all the museums mixing real exhibitions of real objects with interactive systems such as sensitive tables, sensitive walls, sensitive floors and interactive multimedia.
3. **Virtual on real**: this category includes a digital reconstruction of real space that can be browsed and explored.
4. **Virtual with real:** in this category the researchers have identified a type of virtual museum that they define as a digital space built with the use of technology. This virtual space can shape a real space or an ideal space shaped for virtual exhibition. What identifies the virtual museum is that the objects shown are real objects that have been digitalised for display in a virtual space to be better studied or browsed.
5. **Virtual with virtual**: this last category covers museums with digital spaces that do not exist in reality, and where the objects are also born in digital space (they do not exist in real world), and are created only for the museum. That is to say a completely virtual museum, according to this classification.

In the following pages, I will describe the category using the pre-eminent intersections of virtual and real, as seen in the grid.

Dietz (2003: 27) on considering Hoptman's concept of virtual museum (1992: 146) states that:

> *Such existing definitions present a number of binaries: the physical and virtual versus the virtual only; the virtual of physical and the virtual of born digital; being connected online versus connected in a specific physical space. Given the aforementioned hybridity of the museum-library-archive, however, such distinctions are not, in Bateson's terms 'a difference that makes a difference'. 1 For the purposes of this paper, these binaries may be re-combined and are not exclusive of each other.*

I have used this concept in the following categorization.

The category description grid contains a '**Visitor contribution**' column: this is important for the description of the taxonomy model because it can help museum professionals to understand whether their virtual museum experiment will be able to open a conversation with virtual visitors, and to understand whether they are proposing a 'closed' or an 'open' pattern. Other examples regarding '**visitor experience**' will also be described, and, most important of all, but also the most complex to define, in response to the needs of museums, that want to know in advance whether their efforts (also financial) will be fruitful or not. The difficulty lay in finding models and terms that can be understood by the community of museum professionals not coming from the disciplines of Information Technology, Computer Science or Interaction Design. There would also remain the need to describe visitor experiences of virtual museums through in depth evaluation studies. Not having this data, I will use the following concepts.

Deshpande, Gerber and Timpson attempted to provide a theoretical framework for an audience-centred strategy for the optimal performance of virtual museums (Deshpande, Gerber and Timpson in Cameron and Kenderdin, 2007: 261-275). They started from

Aristotelian classical rhetoric and appraisal theoretical framework, but in this taxonomy I prefer to use the model presented by Erik Champion that suggested "*five features of new heritage that may help increase engagement, memory recall, and more appropriate learning*" (2007: 191). Those five features are shown in his table below (Champion, 2007: 191):

FEATURE	NEW MEDIA TRENDS	NEW HERITAGE
INTERACTION: (1) Explorative space (2) Shadow embodiment CONTENT: (3) Social realms (4) Uncertainty OUTPUT: (5) Meaningful historical and heritage-based learning	Persistent shareable and customizable online "Worlds", tangible computing, augmented or mixed reality (AR or MR) Social computing, online communities, dynamic data, Wikis, tagging, new graphical metaphors Innate evaluation, status feedback, commercial success, recruiting, logging of popularity	Can novice and experienced users explore, change, and augment according to attitude, experience, or learning style? Can real artefacts or tangible devices be used? Are users aware of local social constraints? Are different levels of certainty experienced by users? Is user participation meaningfully incorporated? Can changes in the user experience, transferable skills, cultural awareness, and factual knowledge, be verified? Can the relevant data be easily ported independently of the mediating technology?

Table 4. Five features. Source: Eric Champion, Explorative Shadow Realms Of Uncertain Histories, 2007, p. 191

I consider it to be a fact that user experience is subjective, depending on context and is dynamic over time (Law et al., 2009); there are a number of value grids for the definition of user experience, such as the emotional design model (Nielsen, 1994), Jordan's pleasure model (2002) and Hassenzahl's model of pragmatic and hedonic quality (2006), however these scales are not objective, as I will try to define in the

project in the fourth chapter.

On starting the corrections to this research I was fascinated by Champion's framework because it is centred on a virtual heritage project. Champion as a researcher is well aware that the evaluation of digital heritage projects is often neglected. Scientific studies on the evaluation of heritage projects, such as Luigina Ciolfi's PhD thesis, quoted by Champion himself in his work are available, but as they include serious work and measurements that are not applicable to this work in the time I have available. In order to study the user experiences of visitors to virtual museums I will carry out an in depth study in Chapter 4 into two very different kinds of virtual museum.

In order to evaluate user experience, in my opinion it is fundamental to understand the intersections between what a virtual museum can allow the visitor to do, and the different kinds of potential virtual visitors to virtual museums. In visitor studies, Eilean Hooper-Greenhill identifies target groups for museums that may include families, school parties, other organized educational groups, leisure learners, tourists, the elderly, and people with visual, auditory, mobility or learning disabilities (Hooper-Greenhill, 1999: 86). Her work was intended to suggest a partition of museum resources, in order to target, attract, and entertain these different groups. However it is difficult to identify virtual visitors in these target groups with the exception of declared learning resources. I have found the work of Flavia Sparacino (2002) very important in this field. With the same research aim, studying wearable devices in an exhibition environment, she referred to the work of Dean that generalized museum visitors into three broad and much simpler categories

> *The first category includes what he calls the 'casual visitors': people who move through a gallery quickly and who do not become heavily involved in what they see. Casual visitors use some of their leisure time in museums but do have a strong*

> *stimulus or motivation to deepen their knowledge about the objects on display. The second group, the 'cursory visitors' show instead a more genuine interest in the museum experience and collections. According to Dean these visitors respond strongly to specific objects that stimulate their curiosity and wander through the gallery in search of further such stimulus for a closer exploration of the objects of interest. They do not read every label nor absorb all available information, but will occasionally read and spend time in selected areas or with selected objects they encounter in the galleries. The third group is a minority of visitors who thoroughly examine exhibitions with much more detail and attention. They are learners who will spend an abundance of time in galleries, read the text and labels, and closely examine the objects.* (Sparacino, 2002: 25-26)

Dean also puts visitors into the following categories: "*people who rush*", "*people who stroll*", and "*people who study*" in his intention to differentiate them according to their prior experiences and educational level. However this categorization opens the door to the aspect of speed, in accordance with the work of Serrel, that divides visitors into three types: "*the transient, the sampler and the methodical viewers*", adding that "*currently museum evaluators are using terms like 'streakers, studiers, browsers, grazers and discoverers'*" renamed as "*the busy, selective, and greedy visitor type*" (Serrel cit. in Sparacino, 2002: 6-7). Examples of virtual museum categories that will be described in the following pages will take these typologies of virtual visitors to virtual museums into consideration. In further studies I will carry out a more exhaustive analysis of user experience, due to lack of space in this research. I will however provide museum professionals with a key to understand what to expect if they choose any particular category of experimentation in the virtual museum field.

In my taxonomy, user experience will be considered only in the examples I have quoted for each category, and described not in terms of Interaction Design but rather with in the pattern traced by visitors on visiting a specific type of virtual museum.

Examples have been chosen as interesting cases of the models proposed, and also because of their diversity from each other, so that museums can better understand

different and unexpected ways to communicate heritage through technology. As noted by Douglas Hofstadter (1979), science is becoming a complex discipline where it is taken as fact that a phenomenon, can be considered as part of a category, or as within in a 'limit zone' on the boundary of a category, inside the limen, or near the outside. Science and information science, on introducing so called 'fuzzy logic', acknowledge the existence of certain complex liminal zones that avoid exact categorization (Hofstadter, 1985). Given these theories, the examples chosen to illustrate categories of virtual museums have been selected for their pertinence to the characteristics of my categorization, but sometimes, and pre-eminently in two examples from the sixth category, they have also been chosen as paradoxical examples, instrumental to my metamodel in the sense that I have explained above, in order to provide museum professionals with the information they need to understand virtual museum phenomenology.

In the following section you will find the result of the peer review that I undertook to test the validity of my taxonomy, together with a description of the categories and some examples.

3.3 Peer-review for a validation of the taxonomy

In accordance with the external examiners' report on the first draft of my thesis, I carried out a peer-review among AVICOM colleagues and eminent museum professionals in order to validate or modify my taxonomy.

I should point out here that my taxonomy first appeared at a peer-reviewed publication of a conference, 'Consciousness reframed', at the Planetary Collegium held in

Cephalonia in 2012. The publication was 'From the Muses to the Giant Squid', Technoetic Arts, and contained my definition of the virtual museum, as well as a brief version of my taxonomy.

I presented my taxonomy at different conferences:

- 'Augmented Heritage: Some Thoughts on Museum Professionals', Montreal AVICOM General Conference, 10 October 2012;
- 'Realtà aumentata e immersività nei media digitali', Università per stranieri di Perugia, 10 April 2013;
- 'Virtual Museums taxonomy', Rio de Janeiro, AVICOM General Conference, 16 August 2013;
- 'Agorà, museo è territorio, territorio è museo: strategie di musealizzazione ICT nell'era dello storytelling', Università di Siena, 26 September 2013;
- 'Il museo sensibile', San Giovanni val d'Arno, 14 March 2014.

At the AVICOM General Conference in August 2013 and in all the further conferences after this date I asked to participants to send me their opinion for my taxonomy for a peer-review.

The peers that were called to contribute to the review were:

1. Leonardo Marotta, Professor at IUAV – in charge of UNESCO Plan for Venice and its Lagoon (independent researcher)**
2. Marco Gaiani, Professor of Architecture and 3D modeling (University of Bologna faculty of Architecture – museum studies)**
3. Manon Blanchette, Director of Pointe à Callière Museum (former president of AVICOM)
4. Janos Tari, Director of Hungarian Ethnographical Museum (President of AVICOM)
5. Marie Francoise Delval, chargé de la communication interne du DSI chez Ministère de la Culture et de la Communication(Vice president of AVICOM)
6. Luigi Maria di Corato, professor at Università Cattolica del Sacro Cuore, Director Fondazione Musei Senesi (ICOM member)**
7. Vincenza Ferrara, professor of museology at University of Rome (AVICOM member)
8. Nancy Proctor, Museum and the Web conference co-chair
9. Daniele Jalla, Former General Director of Culture Department at Piemonte

Region (former president of ICOM Italy)

10. Alessandro Califano, Senior Curator & Head at CRDAV, Communication Manager at ROSCCA2013 (Tajikistan (ICOMOS - ICOM UK – AVICOM)**
11. Irene Rubino, in charge of communication at Palazzo Madama Turin (AVICOM member)*
12. Elisa Mandelli, PhD Researcher (AVICOM member)*
13. Chiara Kolletzeck, Fondazione del Monte – Bologna – in charge of Archives and Museums IT (AVICOM member)*
14. Giuliana Pascucci, in charge of communication at Musei di Palazzo Buonaccorsi – Macerata (AVICOM member)**
15. Raphael Meyer, Aboav Director of Cinema Museum in Bari (AVICOM member)**
16. Matteo Bellini, Freelance heritage marketing consultant (AVICOM member)*
17. Matteo Pompili, Director of Museo della Mente – Rome (AVICOM member)
18. Luca Marchionni, in charge of communication at MuseImpresa – Museo Zambon (AVICOM member)*
19. Nicoletta di Blas, Researcher of Web Application Design, Hypermedia Applications, and Human Computer Interaction at the Politecnico di Milano (AVICOM member – Politecnico di Milano)**
20. Paolo Paolini, professor of Web Application Design, Hypermedia Applications, and Human Computer Interaction at the Politecnico di Milano (AVICOM member – Politecnico di Milano)*
21. Michela Negrini, Researcher of Web Application Design, Hypermedia Applications, and Human Computer Interaction at the Politecnico di Milano(AVICOM member – Politecnico di Milano)*
22. Lucia Cataldo, Professor of Museology at Accademia delle Belle Arti of Macerata – author of "il museo oggi" (ICOM member)**
23. Antonella Guidazzoli, Chief of Visit lab – Cineca (CINECA – V-Must)**
24. Maria Chiara Liguori, Visit lab – Cineca (CINECA – V-Must)*
25. Sofia Pescarin, V-Must Network Italian coordinator (CNR, V-Must)**
26. Massimo Negri, European Museum Academy President

3.3.1 Methodology of the peer-review

Even though the call for a peer-review was first made on 8th August 2013, it was impossible for many of those members to reply to the calls that I forwarded in several occasions, and the only review that came out was from the 16 people on the list, marked

with the (*) symbol at the end of each line. The individuals marked with the ** were those who allowed themselves to be interviewed.

The participants were chosen primarily from members of AVICOM, both on the international board and in the Italian 'Coordinamento Commissione Tematica Audio-Visivi e nuove Tecnologie'. I also extended the call to well-known professionals in the field of technology inside the heritage context, such as the CINECA Visit Lab (Antonella Guidazzoli and Maria Chiara Liguori), the Museum and the Web International Conference (Nancy Proctor), pre-eminent ICOM members (Daniele Jalla, Luigi Maria di Corato, Lucia Cataldo), and certain academic researchers that are members of the Italian 'Coordinamento Commissione Tematica Audio-Visivi e Nuove Tecnologie', and from other fields as is the case of Marco Gaiani, professor of Architecture and 3D modelling at the University of Bologna, and Leonardo Marotta, independent researcher and scientist, the latter, specifically due to the requirements for a multidisciplinary approach suggested and endorsed by the Planetary Collegium.

In the peer review call the following materials were emailed to all members:

1. the first version of my PhD thesis 3rd Chapter and the chapter on my definition of the virtual museum;
2. the video recorded for the General AVICOM Conference, held in Rio de Janeiro in August 2013, in the presence of the AVICOM and CECA boards (also in the presence of Luigi Maria di Corato, Daniele Jalla, and obviously Manon Blanchette, Janos Tari & Marie Francoise Delval), explaining briefly my taxonomy and making a clear request for peer review to all the AVICOM members.

In the call and subsequent re-calls, the following 3 questions were posed as suggested in the results of the first examination of my thesis:

1. In your opinion is my taxonomy efficient? Do you think that these 6 categories are correct to define the virtual museum phenomenon?
2. Do you think another category is needed?
3. In your work do you find (or not) examples that would fit (or not) in this categorization?

I also gave some additional details to the interviewees as detailed below, because I had started to modify the taxonomy in accordance with examiners' requirements during the peer review: the details I provided concerned the fact that I would specify in more detail the fact that my taxonomy was not chronological, and I would not use the term 'generation' anymore, referring to a bounce of categories instead of generations. Because of the timing of the feedback and because I had to send several reminders and requests for feedback, in very few cases (Pescarin, Di Corato) I also gave some details about the new version of the taxonomy, regarding the fact that I was starting to use a table to categorize all the categories.

My role in AVICOM, first as a board member and later as vice president-elect, as well as my founding and coordinating role in the ICOM Italy's Committee for Audio-Visual and New Technologies, allowed me to conduct an open dialogue with my peers, selected as prominent members of ICOM and AVICOM and academics or professionals renowned for their work in the field of technology applied to heritage.

The interviews were structured in the form of dialogues on the questions listed above. The dialogues were also organized around a common background (projects carried out

by peers who were known to me, or around my field of studies already known to the peers I interviewed), but always starting from the first version of the taxonomy, which was to be 'previewed' before the dialogue could start.

This allowed us to get straight to the heart of the matter during the interviews, to the answers I needed for the review, allowing me to easily understand the peers' points of views and contributions presented and analyzed in the next section, having been incorporated into the new version of the taxonomy presented in this work.

3.3.2 Analysis of the results

The results arrived at different times and degrees of detail; the development of my work was also influenced by the inputs from the peer-reviews. Four peers replied as a group, as did Antonella Guidazzoli with Maria Chiara Liguori, and Paolo Paolini with Michela Negrini. Sofia Pescarin presented my work at V-Must network's WP3 working group, and replied with a suggestion from this working group.

The first review to arrive was from Leonardo Marotta and Marco Gaiani, replying only to the first question, providing particular advice during the peer-reviews (4 for Marotta, 3 for Gaiani) on the methodology originating my taxonomy. In particular, Leonardo Marotta gave me some very important advice on scientific methodology in forming a taxonomy, for example the use of a table for the description of the characteristics of each category. Marco Gaiani provided me with suggestions about components to help in improving the descriptions of each category (virtual/real, technology, user experience) that can be found in the new categorizations and in the methodological explanations of this new taxonomy in this research.

Some of the reviews concerned the validity of my taxonomy, and came from Alessandro Califano, Giuliana Pascucci, Elisa Mandelli, Luca Marchionni, Raphael Mayer Aboav, Chiara Kolletzeck, Matteo Bellini and Luigi Maria di Corato.

In particular, Alessandro Califano and Chiara Kolletzeck found that some of their work as museum professionals could fit inside a category (Alessandro Califano: the fourth, and Chiara Kolletzeck the second), as shown in the mapping exercise figure (in the following picture).

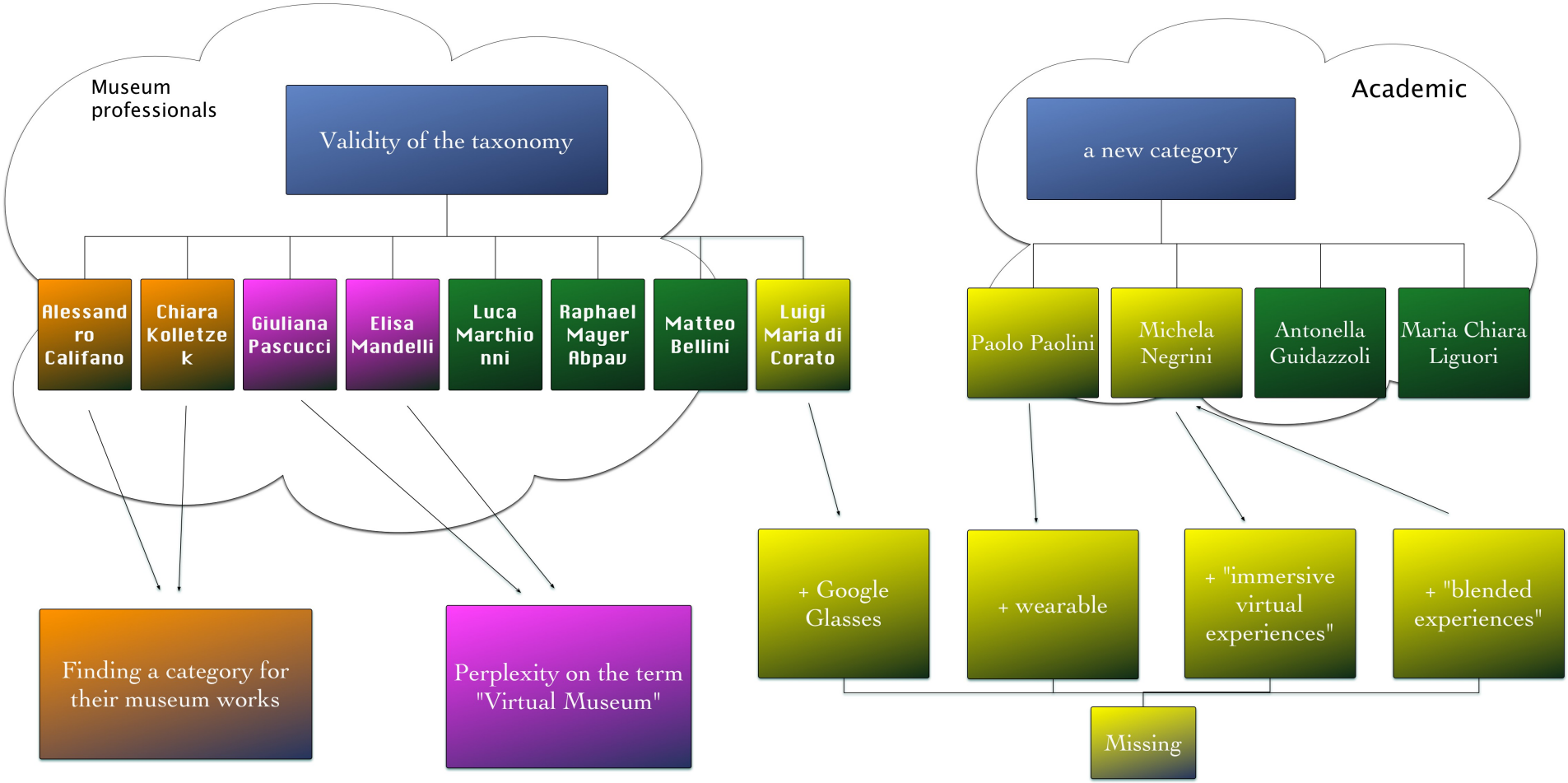
Giuliana Pascucci and Elisa Mandelli asked me about the use of the term 'Virtual Museum', preferring the terms 'multimedia museum', or 'audiovisual museum', as in the case of the Studio Azzurro experimentations in the field of museum exhibitions. This connected with my comments at the beginning of my work about the ambiguity of the term 'virtual', even if the locution 'virtual museum' is consolidated in the museum professionals' community.

Raphael Mayer Aboav, after considering my taxonomy valid, would like to have a reply to the research question "*How can museums restructure their human resources in order to create virtual museum examples of the 6th kind?*". I think the reply to this question is already present in the fourth chapter, that perhaps Raphael omitted to read, focussing only on my taxonomy, which has been set out in more detail now.

Irene Rubio posed some questions about what defines a virtual museum with regard to the subject building this kind of museum: if a virtual museum is built by a private organization (and therefore a collector), or by crowdsourcing, can it still be considered a virtual museum? I have replied to this question in more detail regarding my definition of the virtual museum that stresses the importance of museological standards, so it is

therefore a permanent institution that ‘proposes’ and builds the virtual museum, in clear differentiation to the virtual museums of the fourth category.

Antonella Guidazzoli and Maria Chiara Liguori, who work for the CINECA Visit Lab, but who are also members of the V-Must network of excellence, suggested that I create another category regarding the ‘multiplicated museum’, a field of interest that they are working on, sending me an unpublished paper called ‘Creating new links among places through Virtual Cultural Heritage applications and their multiple re-use’, by Guidazzoli, Liguori, Felicori, Pescarin. In their work they stress the re-utilization of materials produced in other virtual museums in order to create another virtual museum without or with less costs for the institution. During the peer-review with Antonella Guidazzoli she suggested more papers for additional documentation.



Picture 7: Peer mapping model. Simona Caraceni

Explanation of Picture 7

The central row of boxes is crucial; it contains the names of the experts who have actively participated in the peer-review. At the top, they are joined through connectors identifying those who support the validity of my taxonomy (8 participants), while the remaining 4 appear in the box of those suggesting a new category (4 participants). Following the outcome of the peer review, this grouping displays the results whereby mainly museum professionals appreciate the validity of the first version of my taxonomy, while academics have tended to point to the need for changes or even the inclusion of a new category, such as the blue boxes in the upper part of the diagram. The list of names in the central row, have been grouped into two sets; museum experts on the left, with academics appearing on the right. Given that some experts also perform academic or professional activities (eg. Luigi Maria de Corato), the row has been 'modulated' according to prevailing membership of the two communities as seen in the two sets, which have the general appearance of clouds. The colours associated with the names favour the viewing of the input of the individuals, schematically displayed in the bottom row of boxes, linked to connectors coming from those who gave the input. Brown for Alessandro Califano and Chiara Kolletzeck and their input. Pink for Giuliana Mandelli and Elisa Pascucci. Green is used in the box for Luca Marchionni, Raphael Mayer Aboav and Matteo Bellini; the fact that no connector originates from their box means that they fully support the first version of my taxonomy. The choice of green for Antonella Guidazzoli and Maria Chiara Liguori's boxes was motivated by the fact that they suggested a new category, to be discussed later on.

Yellow for Luigi Maria de Corato, together with Paolo Paolini and Michela Negrini, indicates that, although Luigi Maria de Corato belongs to the category of museum professionals (but as mentioned above he also performs academic duties), he has been linked to the two experts mentioned above because he gave a similar suggestion to theirs: a study of Google Glasses, while Paolini and Negrini indicate the addition of wearable technologies, or 'immersive virtual experiences' or 'blended experiences'.

On examining the project I decided not to create another category regarding this kind of museum, because in my opinion my new categorization can fit inside the new D category as shown in the mapping exercise figure.

Their example was about the Apa cartoon character, appearing in the Genus Bononiae virtual theatre, to be re-used as a videogame, converging with the Porticos of Bologna, suggested as a new UNESCO World Heritage Site. For my new categorization, in accordance with the keys that I gave to the new taxonomy, it can fit in the category devoted to enhancements to the 'Collections', making the collection of the museum (Genus Bononiae 3D cartoon) another enhancement in a videogame.

More feedback from Guidazzoli and Liguori concerned the fact that the V-Must network had completed a document regarding their categories of virtual museums, which I had quoted in a version that was online before the delivery of this brand new document. As I explained at the beginning of the third chapter, I find this taxonomy highly valid and scientific, but devoted to the IT professional and Computer Science field, and without easily understood parameters for museum professionals. It is a useful starting point but needs to be 'translated' for museum professionals into concepts matching better their education, museum duties and operative capabilities, less related to computer science and information technology, and more related to communication and museum tasks.

Paolo Paolini, a new member of the Italian 'Coordinamento Commissione Tematica Audio-Visivi e Nuove Tecnologie' with his working group at the Politecnico of Milan,

replied with Michela Negrini. His feedback concerned other cases of virtual museums that they had not found in my taxonomy, coming from his research experience, such as the interactive and immersive experiences for museums and galleries made by Sara Kenderdine, or 'blended experiences' such as those using Google Glass or mobile devices inside galleries (Luigi Maria di Corato also asked for 'wearable' devices as Google Glass to be taken into consideration). They asked me to specify in more detail the category designated in the first version of this work as 'mechanical interaction', as I have tried to do in this new version of my thesis, calling it 'gesture-based interaction', providing the examination of the 'Gli Etruschi e il Mediterraneo. La città di Cerveteri' exhibition in Rome at Palazzo delle Esposizioni as a liminal case.

Sofia Pescarin, from CNR and the V-Must network, gave me some feedback about the correctness of using a table to describe each category. She suggested that I look at V-Must's new taxonomy of virtual museums as did Antonella Guidazzoli and Maria Chiara Liguori, a suggestion that I took into consideration but with the same perplexity that I mentioned above. She suggested that I concentrate on what I want to categorize, because reality itself is not categorized, and that I needed to focus more on the functions of my categorization, a suggestion that was very useful when considered together with the feedback mentioned above. She also suggested some other useful dimensions, if considered in comparison with Nicoletta Di Blas and Lucia Cataldo's feedback.

The most important feedback that I received in my perr-review and that had a strong influence on this new version of my taxonomy came from Nicoletta di Blas and Lucia

Cataldo with more than one peer-review with Lucia Cataldo, and a very fruitful one with Nicoletta di Bias.

Nicoletta has worked for several years with Paolo Paolini in the fields of virtual museum, 3D reconstruction and heritage projects. She had the impression that all the categories were presented very heterogeneously, as were the names that were given to the categories, and she suggested that I start from a particular dimension in order to characterize the categories, better described by a table in which the different dimensions are described as present, or absent, for the category; a suggestion which I applied, as can be seen in my new taxonomy.

Lucia Cataldo gave me probably the most important feedback of all. An active member of ICOM Italy for many years, she is also the author of one of the most commonly used academic museology and museography manuals She agreed that museologists find many technological taxonomies of virtual museum completely incomprehensible and she suggested that I concentrate on the communicative functions of virtual museums. After looking at the Horizon Report 2010, we decided to focus each of the categories on a museum need, in order of communication. The reference for identifying these needs came from the 2010 Horizons report (museum edition). This document, as a summary of the 'state of the art' technology for adoption in museums in 2010, seemed to us to be the most comprehensible of all for museum professionals for understanding the use of technology in museums' experimentation in technology in the past, present and future. Another of Lucia Cataldo's contributions is that, due to the rapid development of technology, my taxonomy would need to be reviewed every two years, in order to be up to date with new experimentation in virtual museums, and new innovations in museology. Cataldo also suggested that I rename the final category as 'complex

museum identity', in order to give relevance to the fact that advanced experimentations can enhance new museological paradigms.

3.4 Virtual museums. Category A

Category 'A': Virtual museum enhancing museum MARKETING with OPEN INTERACTION in a CLOSED SPACE showing SELECTED OBJECTS from the museum collection, NOT allowing visitor CONTRIBUTIONS.

NEED	MARKETING
INTERACTION	Open
SPACE	Closed
CONTENT	Selected objects from the museum collection presented as (Digital) images, texts, audio, video, 3D models
VIRTUAL/REAL	Virtual on real, virtual with real
VISITORS CONTRIBUTIONS	Not allowed

Table 5. Virtual museum category A

Model

To respond to museums' communication and marketing needs, this category of virtual museums has its origin in the same museological model as early museums, that is to say, as a collection owned by the powerful, to be browsed by walking through a gallery, looking at exhibits. In earlier versions of this category there was no possibility for commenting upon the exhibits. In later virtual museums in this category, including web 2.0, the possibility of adding comments was available but not stressed. This model could be said to be based on a gallery with a device based navigation pattern, to be browsed in users' spare time, with a strong contemplative aspect.

In this category historical 3D reconstructions of real museums that can be browsed freely without a pattern are pre-eminent, together with 'closed' websites (without links but containing a 'references and links' section), allowing visitors to take their time in the virtual space, without forcing them into a fixed visit pattern. It is also possible to refer to 'old' experimentations, such as museum CD_ROMs or museum websites allowing the museum's collection to be viewed as a sort of preview visit to the real museum.

In the context of tangible museums, one example could be the Galleria degli Uffizi in Florence. Examples of this type of virtual museum include certain Museums in Second Life (Second Louvre, the International Space Flight Museum, all these galleries are 3D reproductions of real galleries, that allow avatars to walk through corridors and glance at framed JPGs), and the first version of the *Google Art Project*.

Technology

The technology used for virtual museums considered in this category is mostly hypertext, a website with digital reproductions of paintings and an explicatory text that allows, if chosen, in depth descriptions of the objects on display in the museum. The pattern is free, in the sense that visitors can choose what to click, when and how deep to go into the description without any 'forcing' from the system or the structure of the virtual museum.

I have dealt with the 3D reconstruction of spaces in the previous chapters, and as I stated, I do not see them as virtual museums at all, but rather as important experiments in the investigation of the sense of 'space' and 'virtual space' in non-tangible museums. By presenting a case study of this Category A of virtual museums I would like to

discuss the *Google Art Project* here, remitting the patient reader to Category F of virtual museums for other, different cases of museums in Second Life in my taxonomy.

Content

The content of this category of virtual museum are digital objects, which can be observed in different degrees of detail by the visitor. It is important to note that in this category the visitor cannot add or modify the information In later examples comments and sharing is permitted. In the case, the comments are not envisaged to modify the pattern created by the cyber museologists.

Virtual/real

In the grid, the types of museum represented by the 'virtual on real' and 'virtual with real' intersections are dominated by the 3D reconstruction of spaces (such as those shown in Internet Culturale), or websites displaying digital reproductions of artworks.

Visitor contributions

In this model, visitors' contributions to the main virtual exhibition pattern are not allowed. In more recent examples it is allowed to 'share' a link to the page or the virtual museum, using social networks, but this does not mean that virtual visitors can make any substantial contributions to the virtual museum.

3.4.1 An example of Category A: Google Art Project

NEED	MARKETING
EXAMPLE	Free browsing within a closed environment
TECHNOLOGY	Image galleries, plans of the museum, possibility of sharing contents, comparing images and creating one's own gallery, algorithms, search engine and advanced search, 'street view' technology
CONTENT	(Digital) images, texts, Street view technology. The images are reproduction of real objects in the museums or collections, and the plans are drawn from the plans of the selected museums.
VIRTUAL/REAL	Virtual on real
VISITORS EXPERIENCE	Immersive, for the overview of the museum, but not deepening contents

Table 6. Example cat A: Google Art Project

The first phase of this project was launched in February 2011, involving the largest museums in the world and allowing the largest galleries in the 17 participating museums to be toured in the same way as in Google's Street View. Another feature is that for each museum, an artwork is presented in 'gigapixel' format: each of the museums participating in the initiative has chosen an artwork that has then been photographed using high resolution technology. Each of these images is composed of about 7 billion pixels, a resolution which allows details not otherwise visible to the human eye, such as tiny particles and brush strokes of colour, to be clearly seen. The fact that museums show only images of their objects and artworks has been analysed by Neil Silbermann, considering the case of 'the Unicorn', the tapestry in the Cloister museum of New York that has been digitalized at an extremely high resolution. He questions whether this process allows "*the essence of the unicorn to be captured*": digitalization techniques allow details of the object to be caught, but do not "*capture the essence of the space and place the visitors experience the galleries of the Cloister*" (Silberman in Kalai, Kvan

and Affleck, 2008: 88).

From the Art Project – 1st phase screen you can see the location of the artwork within the museum by browsing the menu on the right, with additional information on the author taken from Google, (not much, admittedly, apart from the connection with Google Scholar on scientific papers on the artists, that can be viewed from the guide with a hyperlink to the authors, or explanatory videos taken from YouTube, which is also owned by Google), or historical or general information on the museum itself. Other artworks in the museum can also be viewed in high-definition, however they are not as impressive as the Gigapixel images (of which I repeat, there is just one for every museum participating in the initiative).What else can be done? Not much, although sufficient. Criticism has been made, especially by the foreign press, of the browsing bugs and also of obvious mistakes in photographing the artworks in the galleries and the annoying reflections of light on the artworks, that it at times seems hard to believe that they were not placed there deliberately. However, the comments I have been following in various web communities have all been positive, relating to the possibility of being able to get an idea of the museum, of taking a walk around its digital galleries, of being able to view a maximum amount of information but enough to be able to plan a future visit.

It should be said that Google has provided museums with an agile tool for sketching out 'virtual museums' from Mountain View. An illustrious precedent was an initiative at the Prado Museum, on line from 11 January 2009 using the Google Earth system, with various artworks available in Gigapixel mode, and for this reason not included in the *Google Art Project*.

What I find interesting in Google's Art Project – 1st phase is that the whole system is

centred on the museum, and not on individual artworks, that 'happen' to be located in a given museum. It should not be forgotten that for those persons searching for art on the Internet there are several search tools, first of all, Google, Google Images and databases; however none of these instruments had focused on digital museums up to now.

What seems to me to be a drawback to this project is that the virtual museums that exist in the *Google Art Project* – 1st phase are all cut from the same cloth, looking a lot like a series of digital interactive guides to world museums and we end up finding ourselves in something like a 'digital museum supermarket' with many different contents, all with the same packaging, containing different artworks, all of them on offer, all in the same way. It would seem that the museums involved in the experiment are aware of this risk, and have no illusions about it. To quote Cristina Acidini, superintendent of the State Museums of Florence, on the presence of the Uffizi Gallery in *Google Art Project*:

> *The Uffizi Gallery, the oldest museum in modern Europe established in the heart of Florence to house the art collections of the Medici, the chief patrons of the Renaissance, now enters the realm of Google product opening up to access on a planetary scale. In the course of the virtual tour through the gallery, including over seventy masterpieces works ranging from Cimabue to Goya, users will come across the symbolic image of The Birth of Venus by Sandro Botticelli, a sublime ideal of culture and beauty, epitome of the flowering of Florence at the time of Lorenzo the Magnificent.* (Acidini and Cappellini, 2008: XI)

To sum up, being part of the Google product, given the visibility received, can be an attractive bargain.

I also expected from this 1st phase of the project greater interactivity between visitors: however it is only possible to share the link to the view you are enjoying at that moment on Facebook, Twitter, Buzz (the Google community) and by mail, and therefore there cannot be said to be any 'social' approach in the project. But we are talking about a project, do not get me wrong, where I appreciate particularly the centrality of the fact

that museum has been recognized as the interpretative 'basis' for the enjoyment of the artworks it contains and I look forward to seeing the future developments of this embryonic but promising project.

In recent months *Google Art Project* changed to a second phase (and also a third phase) of the project, being less focused on museums and more on the collections and artworks. Personally, I see this as deterioration. In the second phase the museum has disappeared completely from the screen, becoming only the 'title' of the collection to be browsed and only to be seen in the Google Street View journey. There is no possibility of sharing any more than before except for Google Hangout, and Twitter-Facebook-Google+ and email, but a tool does exist to create 'My (own) Gallery' and to browse other people's galleries too. At the present moment (October 2013) the project has entered a third phase, within a wider Google Cultural Institute that includes the Art Project, World Wonder project and Archive exhibitions. Museums are more visible in the first than in the second phase of the project, but the importance of the collection is predominant: they can be made by the visitors, or by museums that have decided to put only few objects from their collection on the project website. In accordance with the use of the system by visitors, and the fact that Google is making more and more collections available in the project, the interface has changed, giving more importance to the creation of personal galleries, which according to the website statistics are more browsed then the museum-centred or collection-centred views. This would bring these latter phases of the project closer to Category E of my taxonomy. However, as I explained earlier, with these examples I am referring to the first phase of the project. A museum that decided to participate in this project, with a multimedia guide to the museum, responding to the museums' marketing and promotional needs, using all the

services that the Google corporation can provide for museums.

User experience for this example (intended as the first phase of *Google Art Project*) is the experience of an overview of the museum. The virtual visitor can start by browsing a 'gigapixel' artwork, or the Streetview of the gallery. 'People who rush', or the busy or casual virtual visitors, may be captured by the gigapixel artwork, or by the gallery street view browsing, but the 'greedy' visitor cannot get in depth information about the museum, because the marketing strategy's intent to provide the museum with visibility has been enhanced to give virtual visitors the 'feel' of being inside the gallery, probably planning a further visit.

3.5 Virtual museums. Category B

Category 'B': Virtual museum enhancing museum EDUCATION with CLOSED INTERACTION in a CLOSED SPACE showing SELECTED OBJECTS from the museum collection, NOT allowing visitor CONTRIBUTIONS.

NEED	EDUCATION
INTERACTION	Closed
SPACE	Closed
CONTENT	Selected objects
VIRTUAL/REAL	Virtual on real
VISITORS CONTRIBUTIONS	Not allowed

Table 7. Virtual museum category B

Model

Virtual museums of this kind have a very strong hypertextual pattern. It is quite

impossible not to follow the path, with in most cases there being 'next page' button or similar, making these museums seem more like a slideshow then interactive showcases. The visitor is taken on a guided tour, with no way to escape but by leaving the virtual museum. The main examples of this model can be represented by Internet Culturale 'Virtual exhibitions', 2007-2014, the *Lascaux virtual museum* website, 2009; Tim Burton's on-line exhibition, 2010; the *Europeana* on-line exhibitions, 2009-2014, the Virtual Museum of Iraq, but also the virtual theatre of the Genus Bononiae exhibition, showing a 3D movie for a passive viewing by visitors. The need that this kind of virtual museums respond to is that for an educational pathway or itinerary that may go deeper, through the use of technology, into one or more aspects of the objects owned by the museum itself. In the case of Virtual Museum of Iraq, the aim of the model was to create a single resource, that is to say a virtual museum containing all the information about the history of the objects within the museum itself (with nothing similar existing anywhere else in the world).

With its reliance on the need for educational resources, this kind of model can enhance the interpretation of the collection, or highlight neglected pathways. The educational role of the museum is extremely important, as part of the mission of communicating heritage, as the work of eminent museologists testify (Hooper Greenhill). In my taxonomy, this model enhances pre-eminently the response to the need for more, or more exhaustive, educational resources at museums, using technology. In this category of virtual museums there are no constructive learning resources; these will be examined in a special category on virtual museums enhanced by visitor contributions.

In this model of virtual museum, browsing is guided in such a way that it may also be considered a learning environment; however the way the technology works means that

users have no possibility of escaping from the pattern. In the field of real museums, this model would be represented by the introduction to all guided tours. But for examples of real museums with this strong component, I would perhaps refer to certain house-museums or residences of artists; they can only be visited with a guide, and there is no way of skipping the set visit pattern in order to make a personalized tour. This model is also the model to be found in old audioguides, where visitors would don headphones, again with no possibility of skipping the pattern of the audio content.

Concerning audioguides it is interesting to note their principal purpose that is to add paratextual information to the objects on display, where the interest has moved from the displayed object itself, or maybe its reproduction, to the information and communication around it, in other words, to museum paratexts. The concept of paratexts is based on Gérard Genette's narratological and textual typological peer-review published in 1987 in the book Seuils (translated as 'Paratexts. Thresholds of Interpretation', 1997), but their roots go further back in the history of semiotics to Roland Barthes' anchorage concept (Barthes, 1964). All these narrative devices add something to the meaning of a text, and according to Christensen, they can be defined and described briefly in this way:

- Anchorage: a verbal text that anchors and controls the reading of an image. It is placed in close proximity to the image. It is practically impossible to find an image without an anchoring text. The reason is that images are polysemic, i.e., they contain so many codes that a sender must necessarily lead the reader's perception of the image in the intended direction with the help of the anchoring text.

- Paratexts are texts that are placed around the main text and which add extra

meaning to it. The main text is called the hypotext. There are different types of paratexts each with its own designation:

- Peritexts are paratexts that are physically connected to the hypotext without being an integral part of it. This is for instance a book's title printed on its cover.
- Epitexts are paratexts removed from the hypotext. This is for instance a review of a book in a newspaper.
- Autographic paratexts are produced by the producers of the hypotext themselves. For instance, a director's spoken commentary of a film on a DVD.
- Allographic paratexts have been made by someone other than the producer of the hypotext. For instance a review in a magazine of a film.

(Christensen, 2010: 17)

Technology

The technology used in the known and examined examples of virtual museums of this kind is hypertextual, prevalently Flash or HTML, with the presence of 3D models. It may also have a component of passive browsing with strong, closed linear pattern.

Content

The content of the examples in this category is devoted to learning, but in an old-fashioned sense without the hypothesis of inserting feedback on contents or constructive learning models. The digital contents (audio, image, movies, 3D reconstructions) are highly structured and linked together in the desired pattern. If linked with a real exhibition, then it obviously contains reproduction of real objects.

Virtual/Real

In this category the virtual museum presents digitalization of real objects. In the examples that I had the occasion to examine, if there is a virtual reconstruction of spaces (Lascaux), this space is an existing space as will be seen in the following section.

Visitor contributions

Visitor contributions in this model are not allowed. Because of the nature of this category, presenting educational resources for passive browsing and learning, the visitor experience is intense, in order to learn all the contents of the resource on the heritage of the museum. Casual visitors who do not have the will to follow the whole the pattern of this virtual museum will often skip certain elements, because there is no intention to provide certain 'special effects' on the resources on display. 'Greedy', 'discoverers' and 'student' visitors will have a positive experience of the virtual museum.

3.5.1 Category B, first example: Lascaux Virtual Museum

NEED	EDUCATION
EXAMPLE	Guided browsing within a potential learning environment
TECHNOLOGY	The main part of the museum is a 3D reproduction of the cave, with the possibility to click and enlarge images (image gallery)
CONTENT	(Digital) images, texts, audio (soundtrack), 3D model. The digital objects are reproduction of the cave structure/painting
VIRTUAL/REAL	Virtual on real
VISITORS EXPERIENCE	Devoted to learning, rewarding the students, and greedy visitors.

Table 8. Example cat. B: Lascaux Virtual Museum

Coming back to the Category B of virtual museum, a particularly spectacular example of this model is the *Lascaux Virtual Museum*. With an exact reconstruction of the cave built in 3D, visitors are guided to discover the beauty of the wall paintings. It can also

be considered a walk inside a gallery, but here I find the strong learning model prevalent.

It is possible to view all the paintings inside the cave together with an explicatory text. It is important for me to be aware that it is no longer possible to visit the cave in reality, and this virtual tour is the only way to view the paintings in the cave, so this virtual museum also responds to the need of communication of the heritage itself (in reply to the question "*Do you exist? Is there still a way to admire the Lascaux paintings?*"). This 3D reconstruction website also has an audio soundtrack that does not provide any additional information about the heritage of the cave, but that has been created for enhancing the emotional atmosphere of the browsing.

The user experience is strong, because of the emotional involvement, because of the impossibility to view the real cave, and also thanks to the soundtrack. The paratextual information concerns the cave itself and the paintings the cave houses. They provide some information but do not provide the possibility to go any deeper without leaving the website. The busy or casual virtual visitor may be captured by the immersive experience, the methodical viewer will enjoy a complete visit to the virtual museum in its entirety, but the 'greedy' virtual visitor will have to search for more exhaustive information about the paintings or the cave environment itself in other websites.

3.5.2 Category B, second example: Internet Culturale

NEED	EDUCATION
EXAMPLE	Guided browsing within a potential learning environment
TECHNOLOGY	Mostly images, text, speech recording, 3D reproduction
CONTENT	(Digital) images, texts, audio (soundtrack), 3D model. The digital objects are reproduction of real objects, emphasizing the ministerial activity of digitalization
VIRTUAL/REAL	Virtual on real
VISITORS EXPERIENCE	Devoted to learning, rewarding the students, and greedy visitors.

Table 9. Example cat. B: Internet Culturale

Another example of the Category B category of Virtual Museums is the Italian Ministry for Culture's' 3D Virtual Exhibitions[61], where it is possible to view reconstructions in 3D of ancient buildings and to learn about them following a closed pattern, or, as in the example described here, to view on line collections as themed itineraries.

Internet Culturale has been divided into three sections; 3D models, virtual exhibitions and themed itineraries. It is also important to note that in *Internet Culturale* themed itineraries are also presented for libraries. All these examples have their origin in a well-known guide published by the Italian Ministry of Culture, University and Research in 2011[62]. I followed this work from the very first draft, and I found it of great help for smaller museums in creating an exhibition website. With the risk however, as revealed by the *Internet Culturale* website, that all on-line exhibitions follow the same pattern, offering visitors very few instruments for personalization or different ways to browse the contents.

These on-line exhibitions are used by museums, libraries and archive to valorise real

[61] http://www.internetculturale.it/opencms/opencms/it/main/esplora/index.html?tipo=percorso3d
[62] http://www.otebac.it/index.php?it/320/mostre-virtuali-online-linee-guida-per-la-realizzazione

experiences of exhibitions and to provide schools with instruments for going deeper into the contents. The learning aim is very strong. In Italy schools frequently suggest that students browse these educational pathways for homework, or schools are invited to plan a visit to the museum library or archive, promoting a virtual exhibition on the *Internet Culturale* website.

I would like to link the *Internet Culturale* examples with MOMA's on-line Tim Burton exhibition. The Italian Ministry of Culture took this exhibition as an example for the manual for creating on-line exhibitions.

Even if the total look of this experience is better (in graphic and navigational effects), the pattern is closed, and visitors are only able to browse the contents within the pattern, being forced to either follow the pattern, or quit. Learner visitors will follow the whole journey in the virtual visit as proposed by the institution, but I must make the observation that at *Internet Culturale* there are very few resources listed in the virtual exhibition providing further references for going deeper into the proposed virtual pattern.

3.6 Virtual museums. Category C

Category 'C': Virtual museum enhancing museum EXHIBITIONS with OPEN INTERACTION in a CLOSED SPACE showing SELECTED OBJECTS from the museum collection, NOT allowing visitor CONTRIBUTIONS.

NEED	EXHIBITION
INTERACTION	OPEN ('gesture based') inside the galleries
SPACE	Closed
CONTENT	Selected objects
VIRTUAL/REAL	Real with virtual
VISITORS CONTRIBUTIONS	NOT ALLOWED

Table 10. Virtual museum category C

Model

This virtual museum model includes all exhibitions using on-site gesture based technology or the use of Augmented Reality gesture and device based technology, linked to view only and only browsable inside the actual galleries of the museum (and without any outside-of-the-gallery off-site browsing). This is also the main difference with the definition of Category 'A': which covers open interaction within the closed space of the brick and mortar museum, using gesture based interfaces. In this case interaction with the objects and/or information is gesture based, that is to say not mediated by a keyboard and/or mouse or console, but involves the visitor's body taken as a whole (for example installations that require sensors to be activated), or an action to be taken by visitor (touching, pulling, pushing, tapping on a screen). However there is no interactivity with the object/information on display. Visitors cannot add contents or comments; all they can do is use gesture based technology in order to view additional information on the objects on display in the gallery or to reveal extra contents. Examples of this model include the first Science Centres in San Francisco, built in 1969 or La Villette in Paris. For a more comprehensive treatment of the Science Centres, refer to Amodio (Amodio, Buffardi and Savonardo, 2005). Other examples are info-kiosks in museums. VMs following this model include the first Virtual Museum in Italy,

the Museo del IX Centenario, built in 1998, or the initial examples of museum installations set up by Studio Azzurro in Italy, such as the Sarzana Museum, or the 'Fare gli Italiani' exhibition at Turin at the Officine Grandi Riparazioni, commemorating the 150th Anniversary of the Unification of Italy. There is also a learning aim in these models but the difference with the 'B' Category of virtual museums lies in the fact that visitors have to perform mechanical actions in order to access the paratextual contents; they are not simply forced on visitors, as is the case of audioguides or the virtual tour of Lascaux. Some important examples of this model are Studio Azzurro's 'Museo laboratorio della mente' at Santa Maria della Pietà in Rome, 2000; the 'Museu Olimpic de l'Esport' in Barcelona; the 'Museum of Libya', Tripoli between 2008 and 2009; 'Museo dell'Acqua', Siena, 2010; the 'Fare gli Italiani' exhibition, Turin, 2012; the Museum of IX Centenary of University of Bologna, 1998; the Palladio museum, Vicenza, 2012, Genus Bononiae (especially 3D theatre on 'Apa l'etrusco', the 'La Bologna delle acque', exhibit on the history of the University of Bologna). Gesture-based augmented reality and hand-held device based projects can be included in this category.

In 1998 Robert J. Semper traced a framework for multimedia in public space, drawing up a graphic relating the exhibition in the vertical axis (adjunctive resource, mediated experience, exhibit itself, takeaway experience), and the nature of interactivity in the horizontal axis passive presentation, guided experience, interactive browsing, direct creation (in Mintz and Thomas, 1998: 124).

Museums opting for this kind of solution aim to enhance visitors' experience of museum galleries, offering an interactive, immersive experience. In this model, historically, we can also include brand new museums, opting for a massive use of

technology. As was explained in the example of the museum of IX Centenary of the University of Bologna, museologists will have to deal with the concept of maintenance of the virtual museum.

Technology

Technology may include touch screens or interactive projections, activated by buttons (such as the interactive installations at the Museum of the City of New York described in Chapter 2), or sensors. Basically interaction can be activated by the will of the visitor, by pressing a button or touching a screen, or may be started by a visitor approaching hot spot, thus becoming an integral part of the exhibition itself. At this moment in time there are very few examples of the application of Google Glass in galleries, because the project is still in the experimental phase.

Content

The contents of this category of virtual museum are part of the collection. A museum may activate this kind of virtual museum for a particular gallery, or an entire museum may adopt this virtual museum model (i.e. Studio Azzurro), or a gallery may decide to build this kind of pattern for few items from its collection. The multimedia contents, activated by an interface requiring the action of the visitor to be activated, or by the proximity of the visitor to the sensor may be of different types: video, audio soundtrack or a multimedia contents. I do not intend to go into the description of the interaction engaged in by the visitor actively or passively in depth here, because it is not the main goal of this thesis. However I am fully aware that there are precise interaction design issues that are involved in every case of the examples in this thesis. What it is interesting is that the contents can be activated by an active and conscious act by the

visitor (pressing a surface, activating a computer device, or deciding to activate other kinds of content), or the content can start up at the proximity of the visitor, being part of the exhibition pattern.

Virtual/real

In the intersections of the aforementioned work by Beltramini and Gaiani, there is a clear example of an intersection of the 'real with virtual'.

Visitor contributions

Visitor contributions to the collections are not allowed, however due to the interactive nature of this kind of exhibition, the 'pattern' of the visit depends on visitors' choices, thus 'personalizing' their visit pattern, so they can have a completely different visit the next time they visit this kind of interactive virtual museum.

Visitor experience is built up in order to create a sense of wonder in visitors. Visiting this type of museum may be enjoyable for the first visit. After this first, there is no way for the visitor to go deeper, for example by enlarging the dimensions of a picture or video for further details, in the way that the visitor would approach the object to see further details in a traditional gallery.

3.6.1 Category C first example: Museum of the IX Centenary

NEED	EXHIBITION
EXAMPLE	Interactive browsing ("gesture based") inside the gallery
TECHNOLOGY	Inside a museum or a gallery, touch screens, and computer displays, monitors
CONTENT	Digital movies, texts, audio, Quick Time VR movies, 3D reconstructions
VIRTUAL/REAL	Real with virtual
VISITORS EXPERIENCE	"Stunning", both for the casual and for the greedy visitor

Table 11. Example cat. C: Museum of the IX Centenary

The 1998 project of the *Museum of the IX Centenary* of the University of Bologna was intended to create a new type of museum, proposing narratives to be told by the multimedia objects on display. Spaces are offered as fascinating supports for the representations of objects, episodes, characters and 'theories' in which spectators are the protagonists of their own itineraries. The design, completed in the second half of 1999, was aimed at creating a work responding to the request of the commissioners for a space dedicated to the nine centuries of history of the University of Bologna, at the same time creating an innovative form of exhibition for temporary displays with the potential of a permanent laboratory.

The guidelines were:

1. to create a 'chamber of wonders' with a contemporary feel, for example the rooms of the Palazzo Poggi housing the scientific collections of the Academy of Sciences in the second half of the eighteenth century;
2. the need to represent the paradigms of the university that took shape in the city of Bologna: the storage, transmission and pursuit of knowledge and its parallel

variations – past, present and future; time, space, and ritual.

The configuration of the environment, the general criteria for use and interaction of the information and ultimately the aesthetics of the exhibition; the need to make different types of information on the history of the university available to the public with the use of multi-vision techniques for the spectacularisation of spaces.

It was created between 1996 and 1998, and was one of the first virtual museums of this kind in Italy. It was destroyed in 2012, because there was no plan for the restoration or maintenance of the hardware and software; the creators made clear their commitment to the need for this kind of maintenance, now common practice, but this maintenance, after a change in the rectorship of the University, was deemed unnecessary, with the consequence that the system had to be shut down when the touch screens and first projectors broke down with no replacements available on the market and no alternative but to change the format.

At that time the culture to support this kind of museum had not yet been born. All interactions took place through an active action by the visitor (touching a screen, pointing a device). This museum only contained one real object: the Magna Charta Universitatum, signed by a significant proportion of university rectors worldwide in 1988.

In order to understand the visitor experience of this museum we have to go back in time: at the end of the nineties the appearance of all the projections and touch screens, the rotating screen wheels showing Quicktime VR images of University of Bologna environments (such as Archiginnasio, or Piazza Santo Stefano) stunned visitors, engendering the sense of wonder that was part of the museum's commission. Learners

and casual visitors could also have their deep experience: the museum can provide 2 hours of object (video-audio) experience.

3.6.2 Category C second example: the Museums of narration of Studio Azzurro

NEED	EXHIBITION
CATEGORY	Interactive browsing ("gesture based")
TECHNOLOGY	Inside a museum gallery, video, projectors, sound, screens, touch screens
CONTENT	Digital movies, texts, audio, sound
VIRTUAL/REAL	Real with virtual
VISITORS EXPERIENCE	"Stunning", both for the casual and for the greedy visitor

Table 12. Example cat. C: the Museums of narration of Studio

The museums built by *Studio Azzurro* involve a massive use of interactive audio-visual technologies so they have been described by many museum professionals as 'audio-visual museums'.

As noted by Alessandra Mottola Molfino in the Italia Nostra newsletter of 2010, the role of Museums is to be resources of identity; to quote the great anthropologist Ernesto De Martino "*[...] at the basis of the cultural life of our time is the need to remember a homeland, and to mediate through the concrete character of this experience our own relationship with the world*" (1975). In the age of global culture it is no longer necessary to make collections in a few centres of knowledge in capital cities, great libraries and encyclopaedic museums; this task is now carried out by networks of electronic information that can deliver the entire world's knowledge to any home. It has become essential to recognize (and deepen) the cultural diversity and specificity of individual countries, and even small cultural histories: to present the cultural objects that belong to

them in the places, contexts, landscapes where they were born (Mottola Molfino, 2010: 1-2).

The experiences of *Studio Azzurro* in recent years seem to me to be close to this awareness: with a strong technological focus, but moving away from technocentric attitudes aiming at all costs to study the wonder of the technique used in the clearest way possible; starting however from a reflection on the role of exhibitions and museums within a specific territorial, social and cultural context. The explosion of a 'multimedia' culture, reconfiguring models and methods for the transmission of knowledge, leading to changes in mindsets and behaviour and a reconsideration of past values and future projects. Perhaps it is precisely within this multi-media, technological, interactive culture, that we can find a key, perhaps the most homoeopathic, for breathing life back into those places we usually perceive as institutions far removed from our daily lives, to use a metaphor that has guided our design so far. Technology, however, is not the only key. We must, as we have said, approach other, in our opinion, fundamental, elements such as Art and Territory. That is to say the tools, language and material needed to bring the concept of Learning closer, so as to reaffirm function and subject (people) that revolve around these elements and at the same time make them revolve (Cirifino, 2012:7).

Rethinking technology as no longer central to museums, but as purely instrumental in highlighting the role of heritage, society and realization. Its uses may be clever, showy or discreet but never self-reflective.

Technology is therefore an unavoidable challenge, but also an extraordinary opportunity. It offers powerful tools that allow us to collect, order and express data, in ways unthought of in the past. It manifests itself in multimedia language that gives life

to narratives kinetically, fluidly and engagingly, but above all it is the language in which we communicate today, producing new forms of behaviour from within our imagination. It lies in the origin of the unavoidable medium hype that we've been suffering for years, but if this is upturned, we find the potential to reconnect to a common feeling, a channel for dialogue between different and distant elements as has not been the case for centuries. A language that recalls oral culture as an analogy upon which discursive thought and its characteristics have been built: indeterminacy, repeatability, immediacy, simultaneity, fragmentation and connectivity. People need to relate to this language to re-encounter familiarity, to understand and to express themselves, to give shape to the invisible or to rediscover its value.

At this point we can no longer speak of virtual museums, but only real museums sharing a mature technological awareness for reinventing themselves, inviting reflection and contemplation.

Museums are no longer just 'containers' of memory but places where meanings and identity are produced and defined collectively. This leads to the idea that the value of a museum is to be defined not only quantitatively (numbers of visitors) but also in terms of cultural development (how the issues presented have enriched the community) (Cirifino, 2012: 4-7).

It is indeed very interesting how Paolo Rosa in his projects with *Studio Azzurro*, has developed, through technology, the idea of museum space, in line with the concept of Florence Pizzorni (an anthropologist working at the Musée des Arts et Traditions Populaires in Paris) of homo museograficus, an amusing being with two legs supporting a brain from which emerges an eye and we could add a nose and ears if we wanted to expand the faculty, while leaving him without hands in accordance with the sacred

principle that in museums it is always forbidden to touch objects. (Jalla in Gennaro, 2007: 13). Museum space for Paolo Rosa, is closely linked to territory, understood as a Genius Loci (Norberg-Schulz, 1979): linked to the experiences of a community or even a single highly precise discipline, such as psychiatry, astrophysics, to recall certain recent experiences (Cirifino, 2012). Paolo Rosa's way of working produces a project within a space, requiring dialogue between the parties concerned (museum, designers, community, space), and in which technology becomes one of many tools to better structure dialogue between visitors and the community involved.

Space becomes an interpretative space on several levels, taking advantage of the technological potential that allows the paratext to be activated at different levels. The narrative museum of *Studio Azzurro*, in an example given by Paolo Rosa, presupposes the fact that spaces exist to stretch narratives at the expense of information that may be stored in the virtual world, thanks to technology; in opposition to the didactic, methodological, positivist characteristics of 'traditional' museums that weigh down visits today. This 'liberated' space is described in the early work of *Studio Azzurro* as 'the breathing museum' (Cirifino, 2007: 15), exemplified by the possibility that museums could store elsewhere informative, didactic elements thanks to technology, without diminishing their basic function as transmitters of information and the potential of learning. In this way visitors are freed from the obligation to read and learn, in favour of emotion and wonder: more or less what happened in the armoury of the Poldi Pezzoli Museum set up by Arnaldo Pomodoro (Andreini, 2009: 19).

It is also interesting to note that the digital contents in this taxonomy, as provided in the museums made by *Studio Azzurro*, are part of the exhibition pattern, and are activated by the proximity of the visitors, and only in a few cases from an actual 'choice'

(pressing on a surface, of clicking on an interface).

From the point of view of the museum professional, even though awareness increased, there are also cases of *Studio Azzurro* museums that are not open anymore, due to maintenance or budgetary problems, as is the case of the IX Centenary museum described before.

In this example of virtual museums user experience is immersive and highly engaging due to the requirement for an action by the visitor for the contents to be activated; these can start at the passing-by of the visitor, or by an active and deliberate 'touch' on a surface. Casual visitors as well as students and greedy visitors can have the same stunning experience.

I would like to mention here what I've written above about the museum 'pinball machine' described by McLuhan, recalling the idea of the museum without labels. By pressing a button in a technological device it is possible to access any information required by the visitor; more recently this has become possible through the use of QR codes that permit a personal cell phone connected to the network to access information. This implies an active action by the visitor, who must have a smartphone, and perform an action (open the QR code scanning software, point on the QR code, and read/view all the information displayed by the device). All of this implies that the visitor has a smartphone, as well as a mobile Internet connection. Those two facts are in contrast with the concept of global access to the museums as defined by ICOM's definition of museums: a museum must be accessible for everyone, not only those with an expensive phone and a broadband mobile internet connection.

The use of QR codes has been criticized by important museum curators such as Nina Simon, and Nancy Proctor:

> *I've been sceptical of their impact on museums. They're only accessible to the minority of visitors who attend with smartphones, and they're only used by the small percentage of those visitors who know how to download apps and are motivated to access additional content in museums. They've seemed like a sexy 'gee whiz' technology that delivers very little so far.* (Simon, 2011)

And she continues:

> *From my perspective, the biggest issue with how QR codes are deployed in museums is that there's very little information provided about WHY a visitor would want to scan a given code. There's often an object label, a code, and an unwritten mystery about what you'll get when you scan the code. When I visited one contemporary art museum last year, this mystery took on an almost poetic scale. Sometimes, I'd scan a code and get a 10-min video of the artist working on a piece. The next code would take me to someone's website. There was no consistency and few pointers to let me know what I'd get.* (ibidem)

Nina Simon points out very clearly the risks of 'the explanation virus' I have described in a previous part of this work. Nancy Proctor's opinion, expressed in a Tweet from 2011, is even more emphatic "*Good Q! RT @sbhogarty: QR code aesthetics can be prohibitive in exhibition setting-how do we signify visual recognition? #mmonline #mtogo*", manifesting her scepticism on the use of QR codes at Brooklyn Museum she also adds: "*Still no silver bullet? ;-) MT @maesmf: @openexhibits: @archimuse: #qr codes @brooklynmuseum http://ow.ly/8kyFt #mtogo #museweb #SImobile*".

New implementations of Augmented Reality software permit a more transparent way to push information to visitors, for example as LayarVision[63]: "*Right now it can instantaneously detect up to 50 objects and combine them with location-based layers. As Layar co-founder and General Manager Maarten Lens-FitzGerald, puts it: 'Mobile devices can finally 'see'*"". I will go deeper into Augmented Reality issues later on in this work.

[63] http://techcrunch.com/2011/08/02/new-layar-vision-recognises-real-world-objects-and-displays-ar-objects-on-top/. Retrieved on 01-06-2014

3.7 Virtual museums. Category D

Category 'D'. Virtual museum enhancing museum COLLECTIONS with OPEN INTERACTION in an OPEN SPACE showing ALL OBJECTS from the museum collection, ALLOWING or NOT allowing visitor CONTRIBUTIONS.

NEED	COLLECTIONS
INTERACTION	OPEN
SPACE	OPEN
CONTENT	ALL COLLECTIONS
VIRTUAL/REAL	Virtual with real
VISITORS CONTRIBUTIONS	NOT ALLOWED/ALLOWED (*)

Table 13. Virtual museum category D

Model

For Category D of VMs I have taken into consideration projects more similar to comprehensive and flat archives and therefore repositories of plain information with no objects on display. This category covers archive websites. Archives and libraries are marginal to my work, as I noted in the definition chapter, even if the world trend is to consider archives, libraries and museums as the three parts of a single whole[64]. Tangible examples of this taxonomy are Archives and Libraries with the model of the Encyclopaedia, browsable in distributive time. An example of a virtual museum would be *Europeana*, the purpose of which is to gather all European archives, including those of museums, into a single navigable repository, using some of the content sharing functions already in place at all existing major social networks, with some still to be

[64] ICOM Italy (and I remember here that this work is done in benefit to ICOM and AVICOM members) has created the Italian MAB committee, Museum, Archives and Libraries National committee (http://www.mab-italia.org), and evaluating the works of this committ.

defined. This example is relevant in this taxonomy because I support the convergence of libraries, archives and museums in a single global knowledge capacity, browsable from users/visitors by the web.

As I wrote in the definition chapter, I am aware of the difference between archives, libraries, and museums as well as how some important researchers have dealt with this problem.

> *Libraries and museums are both repositories, but libraries are user-driven. The role of the library is to provide access to a vast amount of material, which the user freely roams, making his/her own connections between works. Museums, historically, are curator-driven. They have only provided limited access to holdings, usually through a particular interpretative exhibition context, as provided by curatorial and educational staff. The museum provides a framework of context and interpretation, and the user can navigate within that smaller context. Archives tend to be research driven. They are accessible, often by appointment, in non-public spaces. The archivist has identified an area of the collection a researcher might be interested in, but s/he must go through it physically, item by item, to find out more information.* (Dietz et al., 2003: 23)

This category includes examples of virtual museums that do not fit exactly with my definition, because most standards for traditional museums do not apply. I have explained in the notes on my definition why it is important that virtual museums must fit the standards, as I will further explain in my description of the *Memoro project*. The main examples of this contradiction with my definition of virtual museums can be discerned in the *Virtual Museum of Toy Washing Machines*[65], *Europeana*[66], *Internet Archive (Wayback machine)*[67], *HistoryPin*[68], and the *Memoro Project*[69].

[65] https://picasaweb.google.com/105815533387906154473. Retrieved on 01-06-2014
[66] http://www.europeana.eu. Retrieved on 01-06-2014
[67] http://archive.org/web/. Retrieved on 01-06-2014
[68] http://www.historypin.com. Retrieved on 01-06-2014
[69] http://www.memoro.org. Retrieved on 01-06-2014

Another theorist that endorses the claim that there is a category of virtual museum covering digital repositories is Galluzzi, who in the Treccani encyclopaedia's entry 'virtual museum' states that there are reasons to abandon the strong institutional compartmentalisations of the real world (libraries, museums, archives, archaeological sites etc.) on line, making those repositories more similar to the idea of the virtual museum (Galluzzi, 2010).

This definition may enhance my categorization, between Categories A and B. If a virtual museum is on the web, and does not fit in Category B (with a strong virtual visiting pattern), then it can be placed in Category A, as long as it is not a project coming from a real museum.

> *Digital repositories, whether from libraries, museums or archives, offer users the possibility of navigating through representations of objects and cataloguing records on their own, making their own links between works.* (Dietz et al., 2003: 23)

This enhances the capability of visitors to be curators of digital collections, and introduces the following category to be examined, after a few more examples of this category.

The interaction in this model is open, there are no patterns or suggested routes to follow, allowing visitors to start browsing from wherever they want, probably using the virtual museum's own search engine inside, if present.

Technology

As can be seen from the previously mentioned examples technology is extremely variable. It may be a database browsable through web technology, where the technological potency is used by the database construction, the metadating of objects, and also for the digitalization of images of or as a videogame engine.

Content

The need that this model responds to is to provide a key for browsing a collection more exhaustively and more comprehensively than the exhibition of objects or information in the gallery. It is well-known that museums show and display many fewer objects in their galleries than those kept in storage. This model also provides a response to archives and libraries, with collections of objects or information that need to be displayed, communicated and exposed for the knowledge and the pleasure of civil society. This model can therefore be a response to the communication needs of some less well-known heritage. However in my opinion the need to enhance the exhibition of the collection of objects of a museum as a whole is crucial.

Virtual/real

In these examples there is an intersection between the virtual and the real, but in the case of *Gioventù Ribelle* I will mention below it may also be virtual with virtual. The experiences in this category are heterogeneous, and may show different results in the intersections used in this classification.

Visitor contribution (*)

In this category of virtual museums, in certain paradoxical examples shown below such as the *Memoro project* or *Internet Archive*, visitor contribution may be allowed. In all other cases, as in the 'sense' that I give to this category, they are not allowed.

3.7.1 Category D first example: Europeana

NEED	COLLECTIONS
EXAMPLE	Interactive browsing of repositories
TECHNOLOGY	Web techologies in retrieving information
CONTENT	Digital movies, texts, audio (spoken words, music)
VIRTUAL/REAL	Virtual with real
VISITORS EXPERIENCE	Deep in information retrieval

Table 14. Example cat. D: Europeana

Europeana can be also considered a virtual museum due to the fact that it won the European Museum Academy Award for Virtual Museums in 2013[70]. It is not a museum itself, which may be seen to contradict my definition of virtual museum, but because of fact that it won this award, it can be used as a category example, so that museum professionals can better understand the potential of technology in enhancing all museum collections.

Europeana is the current moment's most ambitious and controversial project. Its purpose is to gather all European archives, including those of museums, into a single navigable repository, using some of the content sharing functions already in place at all existing major social networks, with some still to be defined. The predecessor of this project was Michael, the EU project with the mission of recording all the digital resources of museums/archives in Europe (CD-ROMs, websites, 3D models, …).

Europeana is controversial due to the issue of licensing. Up to now, *Europeana* had always required content licensing as Creative Commons 2.5 'non-commercial' (http://creativecommons.org/licenses/by-nc-sa/2.5/) which excludes categorically any

[70] http://www.europeanmuseumacademy.eu/4/european_museum_academy_prize_406339.html. Retrieved on 01-06-2014

reuse for commercial purposes since 2009. The controversy has recently flared up again because *Europeana* wishes the Creative Commons license 0 (http://creativecommons.org/publicdomain/zero/1.0/) which does not prevent reuse of the project contents for commercial purposes, to be signed irrevocably by the institutions involved in the project.

This proposal has raised a furore among the subscribers to the mailing list of the project and *Europeana* partners. Museums, archives and libraries collect, preserve, manage, document, catalogue, exhibit, communicate, and promote the cultural and scientific heritage for which they are responsible along with associated information for public utility purposes (study, research, information, entertainment, etc.). Digital technologies offer powerful means to pursue institutional goals, and public cultural institutions usually give users free access to their digital content. However there is widespread fear among museum professionals that unknown external organizations may be allowed to create commercial products of any kind, as reported in the debate following the workshop, and the comments in the mailing list. Partners have strongly requested that any use of metadata by *Europeana* or by third parties for commercial purposes should be explicitly excluded. While in some institutional sectors the idea of reusing cultural information for commercial purposes is simply not welcome: "*Giving away a common good created with taxpayers' money for nothing is unacceptable*", whereas others have developed the opposite reasoning: "*For the very reason that data have been produced with public money, they should be allowed any type of reuse, even for commercial purposes*". Another problem is the renegotiation of licenses for the data entered from 2009 up to the present moment, after the previous license, which excluded the commercial reuse of data in favour of the new. A further question is to understand the

concern of museums and other institutions involved about signing an irrevocable agreement for a project that has a conclusion, and a limited life: what will happen to the data held by *Europeana* once the project is over? Museums cannot revoke the Creative Commons 0 agreement in the face of the as yet specified nature of *Europeana* up to the end of the project in 2015, when the project will have to rethink itself in order to allow for its own survival (it is hard to believe that *Europeana* will close in 2015, while it is more realistic to foresee that the project will mutate in some way, if only to allow the operating costs of servers, bandwidths and the staff involved).

User experience includes exploration, searching in the repository and finding the metadata and resources located in the collection of the museums, archives and libraries participating in the *Europeana* project.

3.7.2 Category D second example: Gioventù Ribelle (Rebel Youth)

NEED	COLLECTIONS
EXAMPLE	Videogame
TECHNOLOGY	Unreal development kit
CONTENT	3D recontrucion game kit, video 3D
VIRTUAL/REAL	Virtual with real
VISITORS EXPERIENCE	Poor beacause of the bugs of the videogame

Table 15. Example cat. D: Gioventù Ribelle (Rebel youth)

Museums may decide to valorise their collection using a strong, interactive pattern. However this example concerns a Ministry that decided, in order to celebrate of the 150th anniversary of Italian National Unity, to build a videogame in order to 'speak the same language as youth', helping them to learn about history interactively. In this case the collection is made up of the intangible historical heritage of the facts regarding the

battles of this period in Italian history. This example was chosen for its unique character, and also as a liminal and paradoxical example of an intangible heritage collection made by an institution. It cannot fit in with my definition of virtual museum, but it is interesting for museum professionals in order to understand the category.

The video game *Gioventù Ribelle* (Rebel Youth) was released on 17 March, on the occasion of the 150th anniversary of the Unification of Italy. The press release of March 11 hailed it as a new video game linked to the wider project known as *Gioventù Ribelle*, part of the celebration of the 150th anniversary of the Unification of Italy. Produced by the Italian Videogame Producers Association Assoknowledge – Confindustria SIT, with the participation of students of the European Design Institute in Rome, the game was presented for the first time during the exhibition held at the Vittoriano Complex in Rome from 3 November, 2010, and tested by the President of the Republic, Giorgio Napolitano, who appreciated the revolutionary and innovative idea. The game itself is a three-dimensional interactive adventure in which players have the opportunity to take on the role of a mysterious hero of the Risorgimento and experience first-hand the process of unification of the Italian nation. The action takes place in three scenarios: the Roman Republic, the Siege of Gaeta and the capture of Rome, in a time span ranging from 1849 to 1870.

A project of this type cannot fail to be loved with its involvement of students, bringing their energy and enthusiasm to a project aiming to bring the history of the Risorgimento to young people in their own language. It was produced with the (non-economic) support of some important institutions: the Presidency of the Council of Ministers, the Minister of Youth, the Institute for History and Assoknowledge, part of the Confindustria group, combining all the major Italian video game producers.

But unfortunately something went wrong with the project. On the fateful day of 17 March, the gamers downloading the game from the website realized that there were so many errors that it was almost unplayable; another problem was that it was undersized (there was a single game pattern that could be resolved fairly quickly), as well as its non-user-friendly complexity. By now enough is known about one of the main characteristics of the Internet community: people do not like to be made fools of and they will make use all the mechanisms available on the Internet in order to get their own back. So the next day gaming' blogs and sites gave vent to the gamers' indignation, comparing *Gioventù Ribelle* to Big Rigs, taking up its unenviable mantle as the worst game in history.

The controversy spread to the website of the Corriere della Sera and even to its printed edition. Raoul Carbone, the game's creator, immediately defended himself saying that the project was not for profit and had been conceived as a means to verify the feasibility of producing quality videogames in Italy, attracting foreign investors (and this was a monstrous own goal, because of the great deal of negative publicity for Italy due to this product). For an example of general procedure in the industry the Duke Nukem Forever game was eagerly awaited by the videogaming community for several years, but its release was postponed year after year in order to avoid ridicule. Raoul Carbone and the game's official website went on to claim that the design of the game, as the work of students achieved at no cost and without the technical and / or financial support of businesses or individual professionals from the sector cannot be defined as poor, nor can it be compared with commercial or even amateur products produced by independent developers already in possession of advanced technical skills.

However, these details did not appear on the game's official website on launch day, the anniversary of the Unification of Italy, and the game is no longer available for download, now appearing on the website as an 'alpha' version (which in computer jargon means a draft product almost certainly full of bugs), information that was not available on 17 March. A letter sent to the Corriere de la Sera by the Italian Chapter of the GDA, the International Game Developers Association, said that "*presenting Gioventù Ribelle as a product that can compete with the big international names is in direct contradiction with the way the project was actually carried out by the admission of its own promoters*".

The moral of this sad story is that projects should be treated with the utmost care, even when dealing with young people and social networks, because Internet users can provide rewards and support (as we have seen above), but can be implacable if they feel they have been made fools of.

A year later, in March 2012, Rebel Youth: XX – The Breach: was announced[71]. This is the sequel to the project and is an interactive historical reconstruction of the taking of Rome on the morning of 20 September 1870. It was created with Unreal Engine technology from Epic, already used to create masterpieces such as Gears of War and Mass Effect, with drastic changes in the technology employed and the design team (this time professionals were used) promising to explore some of the scenes of a historic time and place in the first person: ten o'clock in the morning, near Porta Pia. The game was chosen by the Central Museum of the Risorgimento in Rome, with one million visitors a year, as a representative of interactive multimedia works within the 'Rebel Youth'

[71] http://labreccia.wordpress.com/2012/03/18/xx-diveta-giovane-e-ribelle/. Retrieved on 01-06-2014

programme and will be presented in its final version in the museum in two permanent installations by June 2012. It is already freely downloadable from the blog of the game in a beta version from 21 July, 2012.

Eric Champion, coming from deep videogame and heritage studies, observes that "*games that are highly interactive cut a dangerous beast when used in virtual heritage: content is fraggable, destroyed rather than created, and the social position of the participant is continuously threatened rather than established*" (Champion, 2007: 198). So, even if the game had worked properly, it is doubtful that the young players would have learnt anything about the episodes presented in the storyboard of the game.

The potential of this project was very large, but there were also may gaps in the story telling as well as in the game technology. As for Champion's fears, gamers tended to concentrate on shooting the Pope[72], and less on learning the historical facts about the Porta Pia episode.

User experience can be very engaging for videogames, but in this case, in which the game itself was defined as the worst video game in history, user experience was very poor. It could be taken as a warning for museum professionals wishing to make any experiments in this field.

3.8 Virtual museums. Category E

Category 'E'. Virtual museum that enhance museum objects INTERPRETATION with OPEN INTERACTION in an OPEN SPACE showing SELECTED or ALL OBJECTS of the museum collection, ALLOWING visitors CONTRIBUTIONS.

[72] https://www.youtube.com/watch?v=rcGIaG_liFI. Retrieved on 01-06-2014

NEED	INTERPRETATION
INTERACTION	Open
SPACE	Open
CONTENT	Selected work/All collections
VIRTUAL/REAL	Virtual with virtual
VISITORS CONTRIBUTIONS	Allowed

Table 16. Virtual museum category E

Model

In this model, users create an experiment with the objects on display at the Museum, in a constructive and interactive model. This kind of virtual museum involves the idea of a community, not only a learning community such as a school visit accompanied by a teacher, but as a community of people sharing the same interest in the collection, in the objects and information on display in the museum. Creativity is an important component in this category, as is the fact that the community is linked by a strong idea of identity or by a strong professional personal interest in the heritage on display. An example of this model in tangible museums would be the museum's Community of Friends; a community with a strong interest in the collection, making initiatives such as special openings and becoming a focus group for the growth of the museum. In the virtual museum field, I would include all projects involving web 2.0 features, providing the possibility to discuss a particular topic, to share information, and most importantly, to add information and comments on the collection on display. These virtual museums also tend to have a strong presence in Social Networks, although the Museum does not necessarily have to have a Twitter account or Facebook page. In this model the need of the museum is to provide an interpretation of its collection, using technological instruments to actively interact with the public, and making the public interact actively

with the objects of the museum, as digitally reproductions within the virtual museum. Some examples of this can be retrieved in the social space of the Brooklyn and Guggenheim Museums, the MAXXI social network strategy including hangouts for an increasing numbers of museums that are using it, the MOMA Unadulterated audioguides, 'I went to MOMA and…' campaign[73], and the Adobe Museum.

For Clifford, who re-elaborated the theories of Marie Luise Pratt (1991: 34) the museum represents a 'contact zone' (Clifford, 1997). If museums are places of contentious and collaborative relations and interactions, there can be a *place* situated in virtual space where these intense relations and interactions take place. This category of virtual museums brings together all the examples of virtual spaces of interactions, such as the technological *contact zone* in Clifford's definition. Interaction is open, in the way that museums aim to be in conversation with the public. Museum professionals wish to 'take the risk' of an open debate or an open interaction with visitors, using this model of the virtual museum.

In 1995, Stephen Borysewicz attempted to the future evolution of the virtual museum: he predicted the continuous dialogue between audience and museum, the fact that visitors can create their own museum, that they can safely handle artefacts and exchange them (between museum and public, and between the public itself). (in Mintz and Thomas, 1995, 113). This category contains the fulfilment of these predictions.

Another very complete example of this category is the 'memory capsule' project, carried out by Affleck and Kvan for Hong Kong Fringe Club's City Festival in 2006, starting from the theories of Howard Rheingold and Geser. Social software was used for the construction of collaborative content (Affleck and Kwan in Kalay, Kvan and

[73] http://www.moma.org/iwent/ . Retrieved on 01-06-2014

Affleck, 2008: 94-110).

Technology

The technology is web based, with the potential to share the objects of museums in social networks or to discuss them in forums. I will not go too deeply into the description of the technology that can be used in a website to build a forum, a blog or a social network API, or the Google technology used to organize hangouts with curators or between museum visitors. What is important to note is that there is another space for interaction in the web between the museum and visitors, between visitors and the objects in the museum, representing a new potential for museums.

Content

The content is digital, but may include a digital representation of an object from the museum, or a question asked by visitors/curators, and the replies of other participants. The example of the 'I went to MOMA and…' campaign is of great interest here. Visitors were asked to write their impressions of their visit to the MOMA on a Post-it. The technology employed was very low-impact: paper, a camera, and a blog-like website, with the 'sharing on social network' possibility. This initiative was started at the *Brooklyn Museum*, with the white wall where all visitors had the possibility to write down their thoughts that were then photographed and put on the museum's Flickr profile.

Virtual/Real

The intersection is virtual with virtual: users/visitors interact with other users/visitors through their profiles, or with digital representations of museum objects.

Visitor contributions

User experience converges around the cultural message that is the focus of the interaction, and because of this focus, the user experience can be very 'hot'. The participants in this kind of discussion do so because they are interested, and so users are more focused then in other social media interactions.

3.8.1 Two Category E examples: Brooklyn Museum and Guggenheim Museum

NEED	INTERPRETATION
EXAMPLE	Constructivist, where users create experiments with virtual museum objects
TECHNOLOGY	Web 2.0: discussion forums
CONTENT	Digital images, texts and in some cases movies and audio (spoken words, music)
VIRTUAL/REAL	Virtual with virtual
VISITORS EXPERIENCE	Very 'hot'

Table 17. Examples cat. E: Brooklyn Museum and Guggenheim Museum

I have dealt (Caraceni, 2011) with the case of the *Brooklyn Museum* where interaction with visitors has been created starting from direct digital connections between the curators of exhibitions and visitors, thanks to the virtual spaces inside the physical museum open to all who wish to have their say: blank walls made available for the use of graffiti artists, then photographed at regular intervals of time by museum staff and published on the Museum's Flickr channel for sharing, and video cameras made available for sharing visitors' impressions of the exhibitions on the Museum's own YouTube channel. These experiments have proved successful, although it must be admitted that Shelley Bernstein, the *Brooklyn Museum*'s director of web

communications, seems to have been resting on her laurels in recent years and has not been putting forward as many cutting-edge initiatives.

At the *Brooklyn Museum* the most interesting videos on the YouTube channel are now on display at the Museum itself, as part of the permanent or temporary collections.

A few months ago the *Guggenheim Museum* in New York presented interaction forums for use by curators, visitors and experts, following an initiative started by the *Brooklyn Museum* in New York. Unlike their predecessors, these forums are making waves all around the world.

These may be the 'ask a curator'[74] model; permitting users to deal with the themes and terms posed by contemporary art as well as the specific topics arising from the collections on display at the Museum. This allows all users not only to have paratextual information at their disposal on the different collections but also to hold conversations with curators and artists and to add content to the intangible heritage of the VM, intended here as a real interactive web 2.0 website of a community sharing the same interest, but also open to the general public.

And here we can find the realization of Roy Ascott's dream in 'The Telematic Embrace', talking about the possibilities of museum websites:

> *The website is a site of cultural compression, a sort of time hologram, in which any one part, approached at any one time from any one location, leads to all other parts in all other places: both interstitial and inter-sited. Here is to be found the redefined 'gallery' or museum whose internal structure and order are 'implicate'. Implicate, in the sense that artists, the originators of each processive art line, continued to add and amplify their creations, to enfold and entwine them in denser and denser connections and associations, and implicate also in the sense of creating a potential for the unfolding of an infinity of trajectories, according to the myriad interactions and interventions of the world-wide viewing public. This is the very paradigm of a Net art gallery. Against the conventional sequencing of works on the wall that the traditional gallery would provide, here we get a collection of deseriated works, whose order of viewing and interconnection, both semantically*

[74] http://www.museumnext.org/2010/blog/new-post. Retrieved on 01-06-2014

> *and experientially, is wholly open, observer-dependent, and interactive*. (Ascott and Shanken, 2003: 347)

Visitor experience in this kind of conversation is very hot, as I observed above. If a visitor decides enter into conversation with the museum he or she decide to interact with it and, these discussions often become highly passionate and involved. The casual visitor may pass by, but the greedy one will interact actively with positive effects.

3.8.2. Category E third example: Adobe Museum

NEED	INTERPRETATION
EXAMPLE	Constructivist, where users create experiments with virtual museum objects
TECHNOLOGY	Adobe technology (interactive Flash, Schockwave, Flex)
CONTENT	Digital images, texts and in some cases movies and audio (spoken words, music)
VIRTUAL/REAL	Virtual with virtual
VISITORS EXPERIENCE	Immersive and engaging

Table 18. Example cat. E: Adobe Museum

The *Adobe Museum*, created by the producers of the world's most important creative software, is a real virtual museum, holding temporary digital exhibitions with direct links to the artists[75]. Interactivity with visitors is only made possible by the real time interaction when an exhibition is open and there critics have pointed out issues over the difficulty in finding materials and information once the exhibitions are over. This is another case of virtual museums existing outside official museum institutions, both as a paradox and in contrast to my prior definition, but all the same useful for museum professionals to better understand the phenomenon. In fact it is interesting to note that the whole museum was destroyed and taken offline in 2013, showing how a museum

[75] http://www.myawardshows.com/2011/webby_awards/adobe_museum/. Retrieved on 01-06-2014

cannot exist without a permanent institution with a duty to conserve and archive knowledge. It is important to provide this example as part of a historical overview, because it gives museum professionals a taste of how temporary exhibitions can be carried out with the 'state of the art' interaction technology as was the case of Adobe with John Maeda as one of the most important contributors to multimedia studies.

Visitor experience was highly immersive, due to the limited time scale of the exhibitions (this was a museum dedicated to temporary exhibitions) meaning that users have to ask for an appointment with the museum to participate in the exhibition.

This example presents an intersection on the virtual / real grid of virtual with virtual.

3.8.3 Category E fourth example: Sukiennice Museum in Krakow

NEED	INTERPRETATION
EXAMPLE	Constructivist, where users create experiments with virtual museum objects
TECHNOLOGY	Web 2.0: discussion forums, text tecnology, mobile augmented reality device based
CONTENT	Digital images, texts and in some cases movies and audio (spoken words, music)
VIRTUAL/REAL	Virtual with virtual
VISITORS EXPERIENCE	Engaging

Table 19. Example cat. E: Sukiennice Museum in Krakow

I will end this review of cases of communication with the *Sukiennice Museum* in Krakow, and in particular with the campaign 'Secrets behind the paintings'. An Augmented Reality application was created in order to bring younger audiences to the museum's completely renovated collection, allowing visitors to see the drama of the

paintings on display: the characters, the artists who painted them, along with additional material. Young people can also interact with the museum's collection through posters placed throughout the city, allowing contents to be shared on Facebook or other social networks, or even by sending text messages that are then published on a special platform. This campaign was highly successful with the public, making it impossible to book a visit in advance for months due to the huge number of visitors, increasing visits to the museum by 20% for the inhabitants of Krakow, an enviable figure for bringing residents to visit the museum in their own city. This example will be useful for museologists looking for advice on how to enhance the interpretation of objects with 'young' models of communication, such as text messages or Facebook sharing.

3.9 Virtual museums. Category F

Category 'F'. Virtual museum making EXPERIMENTS with NEW MUSEOLOGICAL MODELs with OPEN INTERACTION in an OPEN SPACE showing SELECTED or ALL OBJECTS of the museum collection, ALLOWING visitor CONTRIBUTIONS.

NEED	Experimentation/complex museum identities
INTERACTION	Open
SPACE	Open
CONTENT	Digital movies, texts, audio (spoken words, music), geo-referenced material.
VIRTUAL/REAL	Virtual with real
VISITORS CONTRIBUTIONS	Allowed

Table 20. Virtual museum category F

Model

The last category in this taxonomy is the most interactive of all. In this case the structure of the museum itself creates an experiment intended to create complex museum identities involving visitors, curators, communities, schools and professionals. There are no historical examples of this ambitious project; however I would like to make reference to *MuseoTorino* as an example of a 'real' virtual museum.

As Dave states, "*The more recent and interesting advances in interactive digital media allow non-linear interactivity combined with contents modifiable by users. The wiki-based extensible shared annotation environments are representative of this change*" (Dave in Kalay, Kvan and Affleck, 2008: 45). Also, Jose R. Kos, describing the thoughts giving rise to the Rio-H project and the Glasgow 2000 CD-ROM make interesting affirmations about the representation of history in technological layers, that can enhance the experience of the space with the representation given by technology (Kos in Kalay, Kvan and Affleck, 2008: 132-150).

Museums sometimes have the will to experiment with completely new patterns in planning an exhibition or a museum. This model only provides only one example of what a completely new museological view, with the support of technology, can create. There have been several attempts to create a discipline to be known as new museology (as for the MINOM ICOM affiliated committee, 'International movement for a new Museology'[76]), or the so called 'cybermuseology', term created by Eric Langlois inside AVICOM itself in 2005.

The aim of this category is to open a door to the future, where the potential of new technology and the new museological paradigms intersect. It is difficult to make

[76] http://www.minom-icom.net. Retrieved on 01-06-2014

predictions about the future use of technology in the field of new museology, so the fields of the description of this category will be particularly brief.

Thanks to the observations from the peer review of this taxonomy, in this category I will also present certain paradoxical examples of multimedia repositories or products that were not created in an attempt to build a museum, but that have rather been defined (by the academic community or the professional heritage community) as museums themselves for use by museum professionals to understand better the nature of the category itself. These examples are paradoxical but are useful for a more exhaustive comprehension of the phenomenon, in the creation of complex, new museum identities, opening the door to experimentation in the field of museology using technology.

Technology

Because of the experimental quality of this category, it is difficult to define a priori the technology that would be used in examples of this type. It may involve web technology, different devices or gesture based interaction, or something else. The most important issue here is the creation of a new museum identity using technology.

Content

The content may be the whole collection of the museum or a selection. As in the paradoxical cases of the examples, it may involve the participation of visitors in building the collection, as in *MuseoTorino* or the *Memoro project*.

Virtual/Real

The grid contains intersections between the virtual and the real, the virtual with the

virtual and the virtual with the real as would be expected from the experimental nature of this category.

Visitor contributions

Visitor contributions are permitted, also in the case of increasing autonomously the collections themselves, as is explained in the examples.

3.9.1 Category F main example: the MuseoTorino

NEED	Experimental/complex museum identities
EXAMPLE	Interactive browsing and interaction with objects
TECHNOLOGY	Web technologies, geo referenced information
CONTENT	Digital images, texts and in some cases movies and audio (spoken words, music), geo-referenced material
VIRTUAL/REAL	Virtual with real
VISITORS EXPERIENCE	Visitor contributions allowed to increase collection, user experience rich for greedy visitor, and casual visitor

Table 21. Example cat. F: MuseoTorino

The Museum of the City of Turin has been defined as the best and most ambitious virtual museum project in Italy and worldwide. This is because *MuseoTorino* is also the first Italian project to be selected for Worldwide Excellence at The Best in Heritage, granted by EuropaNostra, ICOM, ICCROM and UNESCO. It covers the city of Turin, linked to a website that contains all information on the history of Turin over the millennia; information that can be recalled during a visit to Turin in the flesh.

> *MuseoTorino is not a just a new museum, but a completely fresh idea. A cross-cutting concept, both real and virtual at the same time, participative and in constant evolution, aiming to present Turin and the testimony of its history to its residents and guests, looking to the past with an eye toward the future.* (Jalla, 2010: 7)

Regarding the website, a visit to the museum starts from the exploration of the map of

the present-day city: information and details about places, events, subjects and topics related to the city can be found by clicking on the marked points. Each place corresponds to a brief identification tag attached to a card catalogue, complete with notes and bibliographical and archive data, as well as links to the institutions referred to for further information. *MuseoTorino* can be searched by categories, themes and chronology. The museum's collection is continually growing thanks to the contributions and knowledge of the city offered by the city authorities, scholars, citizens and visitors. It is associated with an exhibition in the form of Multivision, in sync with screens presenting an interpretation of the city (also known as the 'centre of interpretation' of the museum, situated in Palazzo Madama). A visit to the permanent historical exhibition offers a journey through time through the early settlement and ancient, medieval, modern, and contemporary city. The exhibition was conceived by a scientific committee and elaborated by *MuseoTorino*. The contents can be explored following multiple pathways. The exhibition has been divided into five 'cities': a click on the name of the city leads to the introduction, an explanatory text with some suggestions for further reading. Each city can be visited in different periods of time, or by 'frame': selecting the significant date that appears at the top or the time span that appears at the bottom. Within each 'frame' are interactive maps that can be accessed through the tabs on the sites, an introductory text, a picture gallery and many links to places, events, themes, subjects relevant to the selected period. In each room there is a 'time bar', to facilitate orientation in the tour.

Taking the real city itself as a collection, in its very nature immobile, and the city in time and in constant evolution, not only in the past, but also in the present and future, *MuseoTorino* has had to acknowledge that the only possible form of existence could be

that of a ‘diffuse’ museum – ‘as big as the city’ – and whose collection is also a ‘living collection’ – free to evolve and grow according to its own rules and not those of a museum. And so the configuration itself of the ‘museum’ had to change, adapting to a collection that can only be preserved in situ and respecting the fact that, as it has changed over the past it will also change in the future.

For this reason *MuseoTorino* has taken the form of a virtual location and interpretation centre, taking on both the task of preserving and communicating, not so much the objects that make up the collection, than the knowledge that they hold, making the museum an institution whose functions are to acquire, improve, maintain, document, communicate and undertake research, but with a change in the object, being no longer ‘human testimonies and their environment’, but rather their knowledge.

The virtual tour of the city duplicates a real one that we might make in Turin today, with the streets and squares, the buildings surrounding them, but with the opportunity to discover, beyond what we can see now, their history and that of the people who built and lived in the places we walk past now. With this enhanced awareness of the legacy of the past and the extent to which time and events have cancelled, changed, added, the potential arises to imagine even in the future city, changes that can already be predicted by the effect of events.

Since March 2011, coinciding with the start of the celebrations of the 150th anniversary of the Unification of Italy, the Medieval Court at Palazzo Madama has become an open access exhibition space hosting a new generation display in the form of an ‘immersive’ multi-sensory event-show. The visitor passes from the sight of the plain from which Roman Turin emerged, to the city in late antiquity to the low and high middle ages, baroque and modern eras up to the contemporary metropolis in a journey through time

intended to reconstruct the history of Turin at a glance.

Rogiers and Truyen talk about historical representation. They say that historical representations must be in 3D, but they also clarify that these three dimensions are chronological, spatial and social (Rogiers and Truyen in Kalay, Kvan and Affleck, 2008: 71), representing time (allowing the visitor to navigate through different time layers), space (interactive maps that can show evolution, demonstrating simultaneous processes), and community (also intended as showing the practice of different social groups in history).

As a case of a completely experimental model of communication heritage, Museo Torino provides the intended museum, that is to say the city of Turin itself with a different museological paradigm making the 'objects' stored in museum touchable and usable by the citizens, in a completely different way to what is generally intended with museum objects, to remain untouchable. The objects stored in museums are in continuous and this evolution and mutation are on display. In this museological paradigm, the technological strategies used by the virtual museum website, the app, the 'centre of interpretation' give, taken as a whole, the impulse of a completely new museology, even though the technologies used are consolidated.

To return to McLuhan, I would like to report some of his thoughts on the Museum of the City of New York, and its relationship with New York City itself. His experience of a Circle Cruise around Manhattan Island with its fantastic incongruity made him see the environment itself as the greatest surrealist gallery in the city. Manhattan is an island and a museum, whose inhabitants, like people on other islands, have taken to living in

discontinuous, tribal space, largely devoid of story-line. For McLuhan, museums are too continuous and connected, not tribal enough (McLuhan, Parker and Barzun, 1969: 18).

3.9.2 Category F second example: White noise exhibition – metaverse experience

NEED	Experimention
EXAMPLE	Interactive browsing and interaction with objects
TECHNOLOGY	MMORPG (Massive Multiplayer Online Role-Playing Game)
CONTENT	Digital movies, texts audio (spoken words, music), geo-referenced material
VIRTUAL/REAL	Virtual with real
VISITORS EXPERIENCE	Immersive

Table 22. Example cat. F: White noise exhibition – metaverse experience

The experience of metaverse seems to be significant also for Roy Ascott's theories, in 'The Telematic Embrace':

> *To bring the Net gallery into the world, a world that can only associate meaning with materiality, and thus museums with ownership, space with security, walls with certainty, is to demand radically new cultural behaviour and to initiate, however tentatively, a new social process.* (Ascott and Shanken, 2003: 347)

Working in MMORPG as Second Life platform gave me the opportunity to test my theories about a virtual museum that could be really comparable to real museums. Second Life platform is a metaverse based on a 3D space, and as I noted before if space is the medium of museums, virtual space is the medium of virtual museums. So what about a virtual museum built in a credible 3D world?

As we have seen in the previous sections, in recent years there have been many attempts to build museums on a technological platform. None of these efforts were particularly successful for several reasons. One was the lack of a usable, shared, simple interface.

Then, even if the platform worked, the lack of museal criteria involved in the curatorial activity performed by IT and media professionals made the experiments fail.

Concerning the case of digital art, net art and technological representations, we must focus on the quotation below. This quotation, taken from the beginning of Jean Baudrillard's 'Simulacra and Simulation', where Baudrillard refers to Qoelet, explains very well my idea of a virtual space for representation and display of masterpieces.

> *The simulacrum is never that which conceals the truth. It is the truth which conceals that there is none.*
>
> *The simulacrum is true.* (Baudrillard and Glaser, 1994: 1)

In my research I noticed that this question cannot be found in Ecclesiastes. It is an example of a simulacrum in Baudrillard's sense. There is no reality (i.e. text in Ecclesiastes) only the simulacrum is 'real'. And this concept takes us to the issues related to the essence of digital artworks: problems of authorship, of copies and originals, real consumption of real masterpieces, and technological consumption of digital masterpieces that can also include Benjamin's speculations on the reproduction and reproducibility of art (Benjamin, 1936).

Discovering the MMORPG called Second Life, I entered an intuitive, usable platform, made in 3D for 3D interactive contents, strongly interactive, and reasonably 'the' platform to create real 3D environment for people, researchers, learners and communities. Second Life platform is a 3D virtual world entirely built and owned by its residents. Since opening to the public in 2003, it has grown explosively and in 2008 it was inhabited by 4,709,191 people from all around the globe. Second Life platform has a fully-integrated economy architected to reward risk, innovation, and craftsmanship. Residents can create their own virtual goods and services. Millions of Linden Dollars

change hands every month for the goods and services residents create and provide. This unit-of-trade is the Linden Dollar, exchangeable for US Dollars at a rate of 250:1. Because residents retain the property of their creations, they can be exchanged in various in-world commercial venues.

A MMOPRG as Second Life was also interesting for me because it is a game, and a mimicry game, according to Callois' definition (Caillois and Barash, 2001). It simulates real life, and real life can be a simulation of Second Life, in which people play, fall in love, establish friendships, do business, work, have fun and learn. MMORPG represents a simulacrum of reality as defined by Baudrillard. We don't need real-world museums, if we can build museums in a simulation world, because it is a world too.

Finally, it was important for me to consider the strong innovation of the called Web 2.0. Web 2.0, a phrase coined by O'Reilly Media in 2004, referring to a perceived second generation of web-based services – such as social networking sites, wikis, communication tools, and folksonomies – that emphasize online collaboration and sharing among users. Its exact meaning remains open to debate, and Tim O'Reilly provided a compact definition of Web 2.0 in 2005:

> *Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them.* (O'Reilly, 2005)

My experimentation in Second Life platform consisted of an exhibit of 2 installations curated by myself with my avatar Scar Undset; 'White Noise' by Mosmax Hax and '21 Sonnets' by Alpha Auer (aka. Elif Ayiter) that were put on display at the museum of The International Telematic University, Nettuno starting from 20 December 2007, 11.00

SLT.

'White Noise', which was also an award winner at Ars Electronica this year, is an architectural construct assembled out of the detritus of Second Life and this is the first public showing of the work. '21 sonnets', is a typographic installation of 21 Shakespearean sonnets. Although the two works were conceived of separately they have been merged into one cohesive whole which works in conjunction with the architectural space of the museum itself, for the purposes of this event.

This exhibit was displayed at University Nettuno's 'Island of Knowledge'[77], the first electronic university in Italy. On the island could be found virtual classrooms, spaces for interaction between tutors, students and professors. Rector Maria Amata Garito wanted to create a museum, as a space of for amusement and entertainment for all the avatars of the Electronic University.

In one part of the island, according to my suggestions, the programmers built a glass pyramid that was to contain the museum's collection. It is interesting to note that at the beginning this pyramid had two floors and some stairs, because the programmers thought that avatars had to actually walk into the museum. This is nonsense, because one of the most singular characteristics of the platform Second Life is the possibility to fly everywhere, but the second problem was the programmers materially 'appended' framed pictures on the virtual walls of the museum, representing masterpieces in jpg format. This was a complete misunderstanding of the potentiality and meaning of a

[77] http://slurl.com/secondlife/International%20Telematic%20University/123/165/33. Retrieved on 01-06-2014

virtual museum in the virtual space of Second life platform, that can offer much more than hanging a jpg of the Mona Lisa on a virtual wall. I can speak of this episode sympathetically because as I wrote for the A Category of Virtual Museum, the naivety of IT specialists mean that they are often unable to understand the complexity of museums and the potentiality of interactivity in virtual spaces.

In 1992 Bearman stated that if the cultural barrier to acceptance of copyright for digital media were overcome through collaboration and broad cultural re-education, there would still remain numerous technological barriers to the full implementation of interactive and hypermedia in museums. Until recently the most serious of these barriers was the poor visual quality of most interactive and multimedia products. For a community priding itself on connoisseurship, television quality images, and even images displayed on high end engineering workstations, were simply inadequate to convey the detail and the richness of colour in unique objects of great cultural value (Bearman, 1992: 5).

The quality of 3D enhancement and image quality in Second Life as all the MMORPG depends on the client's computer and the quality of the graphic card installed by many users leaves a lot to be desired.

In my curatorial activity for this exhibition I asked for all the walls and intermediate floors to be destroyed and to allow the artists (Mosmax and Elif Ayiter) to build the two virtual installations.

> *The two installations were conceived of separately: I decided to utilize the ceiling of the huge glass pyramid and created a typographic construct made up of 21 of my beloved Shakespeare sonnets, leaving the floor to 'White Noise'. Mosmax ended up constructing staircases which join and merge the two installations, which*

> *works really well I think...* (Elif Ayiter AKA Alpha Hauer, on White Noise building)[78]

The Museum was opened for the ceremony of Christmas Greetings, the 20 December 2007, for all the students and professors of the University. The experience was highly successful and the installation inside the museum remained for some time for all the avatars that wished to visit the museum itself.

Even though this experiment took place a long time ago, I still believe it's significant for my research for two reasons:

1. the decision to destroy the floors and stairs goes in the direction of destroying the walls of the museum, making it into Malraux's 'museum without walls';
2. very few experiences in Second Life platform point to a correlation with 'reality', in fact in general terms, there cannot be said to be a correlation.

Even if Second Life platform has lost a certain amount of popularity and educational institutions that once had a strong presence in the metaverse are now abandoning it, some researchers report that what happens in 3D interactive immersive worlds such as Second Life platform can have some effects for individuals in real life. As Elif Ayter reports in her work,

> *While web 2.0 domains have provided unprecedented user interaction and participation online, the metaverse has taken further steps in creating an awareness that takes participating agents to an entirely new level, providing not only social interaction and participation but also presence. This notion of bodily presence provided through the three dimensionally embodied avatar, who is a highly responsive and influential virtual extension/counterpart of the human behind the keyboard, creates far deeper reaching implications than a mere novel display system or tool can indicate. New forms of embodiment, of presentation as well as perception are being materialized, as has also been previously the case in online games and simulations.* (Ayiter, 2012: 50)

Ayiter's work, that is mainly concerned with experiences and educational experiments

[78] Elif Ayiter, comment on Flickr page of the project.

in Second Life platform using the changes in appearance and abilities of students' avatars, were strongly influenced by Yee and Bailenson's studies on the so called 'Proteus effect' (Bailenson and Yee, 2007a and 2007b and 2009). At first Yee and Bailenson performed an experiment asking participating individuals to represent themselves by a tall or short avatar (Bailenson and Yee, 2007a). The two researchers found out that the representation of the self-changed behaviour, the degree of aggressiveness or kindness of the individuals in negotiations or in other sample activities they were asked to perform in Second Life platform during the experiment.

Their second work in 2007 is seminal in this field; the aim was to establish whether social behaviour and norms in virtual environments are comparable to those in the physical world.

> *In an observational study of Second Life, a virtual community, we collected data from avatars in order to explore whether social norms of gender, interpersonal distance (IPD), and eye gaze transfer into virtual environments even though the modality of movement is entirely different (i.e., via keyboard and mouse as opposed to eyes and legs). Our results showed that established findings of IPD and eye gaze transfer into virtual environments: (1) male-male dyads have larger IPDs than female-female dyads, (2) male-male dyads maintain less eye contact than female-female dyads, and (3) decreases in IPD are compensated with gaze avoidance as predicted by the Equilibrium Theory.* (Bailenson and Yee, 2007b: 1)

declaring after a massive test in Second Life, that the

> *findings support our hypothesis that our social interactions in online virtual environments, such as Second Life, are governed by the same social norms as social interactions in the physical world. This finding has significant implications for using virtual worlds to study human social interaction.* (Bailenson and Yee, 2007b: 5)

In 2009 the researchers went on (Bailenson and Yee, 2009) to discover that certain *changes* in behaviour arising from Second Life experiments then appeared in the 'real world':

> *Another important question that has not been addressed is the duration of the Proteus Effect outside of the digital setting. For example, given that the average*

> *user of online role-playing games spends 20 hours per week interacting with other people via their avatar (Yee, 2006), it is important to understand whether behavioural changes that occur due to the Proteus Effect in digital environments persist in subsequent face-to-face settings.* (Bailenson and Yee, 2009: 20)

Yee and Bailenson also refer to other studies in computer mediated communication and cyberpsychology: where according to (Hiltz, Johnson and Turoff, 1986; Short, Williams and Christie, 1976) lack of social presence or the lack of social cues (Culnan and Markus, 1987; Kiesler, Siegel and McGuire, 1984) creates an impoverished social environment, whereas others have shown that relationships develop more slowly in CMC but are not impoverished in the long term (Walther, 1996; Walther, Anderson and Park, 1994). Other research has shown how narrow communication channels in CMC impact impression formation (Hancock and Dunham, 2001; Jacobson, 1999; Trevino and Webster, 1992; Walther, Slovacek and Tidwell, 2001). And although there has been some research on self- representation in online environments, the focus has been on the impact of anonymity and authenticity (Anonymous, 1998; Flanagin, Tiyaamornwong, O'Connor and Seibold, 2002; Jarvenpaa and Leidner, 1998; Postmes and Spears, 2002) — in other words, the gap between the real and virtual self and how that difference changes social interactions.

Given these references and my additional research work after the first submission of this thesis, I deny that on-line experience is the same as a real world experience, as can be seen the references in Chapter 1 to the sense of *place* and proxemic interaction between visitors visiting an exhibition in a brick-and-mortar gallery. However it is interesting to note that some of the aforementioned researchers recognize *some kind of similarity* between real-life behaviour and MMORPG as Second Life platform behaviour, in the

interaction of individuals, mediated or not by avatars, and keyboard-screen-mouse interface.

So, the interaction of visitors in brick-and-mortar spaces visitors is different from the interaction of on-line MMORPGs. However, studying and performing experiments with museums in Second Life platform enriched my experience of virtual museums, and the categories of virtual museum composing my meta-framework of classification.

3.10 Complex museum identities: paradoxical examples

At this point, to illustrate the concept of complex, new museum identities, I intend to provide two examples of virtual museum that are in my opinion useful for museum professionals to understand the potential of virtual museums, even if these examples do not come from museum institutions, and cannot be considered as virtual museums, given my definition that stresses the importance that virtual museums apply museum standards.

In my opinion, *Internet Archive* and the *Memoro Project* invite reflection for understanding the existence of a new kind of digital heritage, on how museums can reap benefits from the efforts of Internet visitor communities, and how the building of new kinds of museum around the conversation of new emerging heritage as well as tangible heritage. These two paradoxical examples also illustrate how a complex, new museum identity may be considered in the enhancement of collections built by visitors or automatic engines.

3.10.1 Category F first 'PARADOXICAL' example: Internet Archive Wayback Machine

NEED	EXPERIMENTAL – COMPLEX NEW MUSEUM IDENTITIES – (COLLECTION)
MODEL	Interactive browsing of repositories
TECHNOLOGY	Web technologies in retrieving information
CONTENT	Digital movies, texts, audio
VIRTUAL/REAL	Virtual with virtual
USER EXPERIENCE	Intriguing for occasional visitors and also for greedy visitors

Table 23. 'Paradoxical' example cat. F: Internet Archive Wayback Machine

The *Internet Archive* is a free online resource that was created in 1996 to build a digital library of Web pages and other cultural artefacts in digital form with the purpose of offering permanent and free access to researchers, historians, scholars, and the general public. *Internet Archive* provides not only an archive of websites but also of open source movies, feature films, cartoons, historic newsreels, and news video and music.

Five years after its creation, in October 2001, the *Internet Archive* launched the Wayback Machine, which provides the public with a free online service to search for and access archived Web sites. The name of the search service is derived from the Rocky and Bullwinkle cartoon in which the characters of a bow-tied dog, Mr. Peabody, and his boy assistant, Sherman, used a time machine called the WABAC Machine to travel back in time to famous events in history.

The Web pages are collected for the *Internet Archive* using a search engine technology called Alexa Crawl that traverses the Internet taking snapshots of Web sites. The Alexa Crawl currently captures about 1.6 terabytes (1600 gigabytes) of Web content per day and takes about two months to complete a snapshot of the more than 16 million Web sites accessible online.

The *Internet Archive Wayback Machine* can be considered an Internet museum and is also useful for browsing museum websites after their appearance several years ago[79]. The experience for the user is totally free, where they can browse different versions of website going back to Snapshots from 1996. The experience may often be poor, because the Wayback machine does not store web technology (for example older versions of Flash, Shockwave plugins etc.). There are also projects that are supposed to browse the *Internet Archive* from a historical perspective (Aya, et al., 2006) with the use of retro-browsers. Researchers can find useful historical information in this archive as part of a history of software perspective.

The facts of the existence of a collection that has not been built by the efforts of museological experts, and that the collection is browsable from the web, make it into an exposed archive and by extension a museum for the research and amusement of Internet visitors.

3.10.2 Category F second 'PARADOXICAL' example: Memoro project

NEED	EXPERIMENTAL – COMPLEX NEW MUSEUM IDENTITIES – (COLLECTION)
MODEL	Interactive browsing of repositories (digital)
TECHNOLOGY	Web technologies in retrieving information
CONTENT	Digital movies
VIRTUAL/REAL	Virtual with real
USER EXPERIENCE	Intriguing for occasional visitors and also for greedy visitors

Table 24. 'Paradoxical' example: Memoro project

The *Memoro project* has its origin in an idea of its two founders, who in the summer of 2007 thought it would be a good idea to be able to create a system for the collection and

[79] http://museumnerd.org/2014/03/13/10-vintage-museum-web-pages-from-the-1990s/. Retrieved on 01-06-2014

dissemination of the stories and memories of older people. On returning from holiday they started to bring together a diverse group of people who could give substance to the idea. They chose the video interview as the method for the collection of memories and the Internet as a medium for dissemination.

Anyone can upload and share their own stories or those of loved ones on the website, after an editorial review of the content and the quality of the video. The only limitation is that the people interviewed were born before 1950. The objective is to bring back ways of life and memories of great historical events from the last century to the present day. Another wonderful response came from schools, thanks to the teachers who became interested in the project. In recent years several different courses have taken place at different institutions where children were shown the basic techniques for carrying out interviews. The results and responses were encouraging; great interest was shown and many interviews with grandparents were then uploaded. Memoro was founded by Enel that 'used' the project to build a knowledge management database for its company, also founding other parts of the project, as did Eataly and other companies.

The main problem with this project, that would seem to be the virtual museum of 'living' memories of people, is the fact that this heritage is not preserved by an institution. That means that loss of funding can make this website close, thus making its collection inaccessible. I believe that this example of a borderline case in my classification gives an idea of the reasons and theories behind my definition of the virtual museum that will engender further research.

In this brief section I have analysed two paradoxical examples, more similar to archives than museums, so that museum professionals can understand the potential of the technology applied to museums, the vanishing boundaries distinguishing the challenges

in the communication of heritage, engaging in conversation with the public.

3.11 Comparison experiment between Virtual Theatre Genus Bononiae and MuseoTorino

I undertook an experiment with the ambitious goal of proving the theories that I explained in the previous section, and in order to find out real and tangible similarity between the 6 categories of virtual museums. My taxonomy as explained in the previous chapter includes very different types of virtual museum in a single category. I undertook this experiment to prove my theory, because if my definition of virtual museum works and my taxonomy can include very different types of different museums, proving that those different examples are comparable, then it can be said to work.

This comparison may seem strange: comparing a virtual theatre and a website. It seems something like comparing apples with oranges (Sandford, 1995: 1) but given the nature of my research work up to now, this is not the case. The Genus Bononiae virtual theatre and *MuseoTorino* are both virtual museums, and I can say (without revealing the numbers) that the costs of both museums are comparable and similar. As my taxonomy shows, the concept of virtual museums covers so many different experiments that most (if not all) of the experiments conducted up to now are covered.

Genus Bononiae Virtual Theatre

NEED	EXHIBITION
CATEGORY	Projection inside a museum gallery
TECHNOLOGY	3D projection
CONTENT	Digital 3D movies, dolby surround sound
VIRTUAL/REAL	Virtual with virtual
VISITORS EXPERIENCE	Passive watching film, sitting

Table 25. Genun Bononiae Virtual Theatre

MuseoTorino

NEED	Experimention/complex museum identities
CATEGORY	Interactive browsing and interaction with objects
TECHNOLOGY	Web technologies, geo-referenced information
CONTENT	Digital movies, texts audio (spoken words, music), geo-referenced material
VIRTUAL/REAL	Virtual with real
VISITORS EXPERIENCE	Interactive retrieving information, browsing the timeline and exploring the map

Table 26. MuseoTorino

The comparison between those two examples was undertaken because one, the Genus Bononiae 3D theatre is a very 'old-fashioned' conception of a virtual museum, consisting in a 3D cinema, for passive consumption, that I have defined as a Category C virtual museum. This is also an example of the 'borderline' field of my taxonomy, as explained in the methodological explanation of the studies on fuzzy logic and complexity theory (Hofstadter, 1979: 1985). This room in the Museum of the History of Bologna consists of a non-interactive, closed, spatially and interactively, 3D film about the history of Bologna in Etruscan times.

The film tells the story of 'Apa the Etruscan', the cartoon made by Cineca for the Museum of the History of Bologna Genus Bononiae, winning the award for best short feature in the audiovisual section of the International Audiovisual Festival in Museums and Cultural Heritage – International Audiovisual Festival on Museums and Heritage – FIAMP of AVICOM in 2012. Apa has already won other international awards: at Siggraph Asia 2011 in Hong Kong, in the Multimedia section Posters, and was ranked in first place at the event eContentAward Italy 2011 as the best product in the category Italian eCulture and Heritage. On the same occasion it also received a special mention for the eLearning and Education section.

This 3D stereoscopic cartoon made for Cineca Genus Bononiae tells the story of the city, combining great philological rigour with cutting-edge innovative technologies and was produced entirely using computer graphics by most powerful supercomputer in Italy at Cineca[80].

This example will fit in the category for enhancing museum education, because it is a

[80] In the new Museum of the City of Bologna (http://www.genusbononiae.it), in an immersion room ready for 3D stereo movies designed ad hoc by Cineca (http://www.cineca.it), the public will encounter a unique experience halfway through their visit: a journey through time, a sort of Big Bang of Bolognese history, 2700 years in just 14 minutes. This visit will be led by a friendly 3D character: the Etruscan APA, whose name means 'father'. … It is the first 3D Blender-made stereo movie with high historical standards applied to an entire city with four different geo-referenced scenarios and six historical periods: Etruscan, Roman, Renaissance, XVII and XVIII century and the present day. The methodology developed for this realization, focused on open source and an inter-disciplinary framework, has been of great help in this endeavour and will be the main point of this presentation. (Guidazzoli, 2011: 1). As for the 3D movie shown at the Virtual Theatre, CINECA in the person of Antonella Guidazzoli, Team Leader, and: «the experience of modelling a philological three-dimensional scenario (the Sala Bologna) as a set for a 3D stereo cartoon movie in the Cineca MDC ('Museo della Città', i.e. museum dedicated to the history of the city) cultural heritage project». In 2009-2011 Cineca was involved in the challenge of reconstructing three-dimensional historical scenarios to show Bologna in different ages as it probably was (the sets are philologically accurate). This movie will be part of the museum itinerary in `Palazzo Pepoli' and displayed in the immersion room especially designed by Cineca. The aim is to take advantage of computer-based visualization methods to deliver information (culture) minimizing cognitive overload. The choice of Open Source software made the production pipeline a case-study highlighting interesting features such as model reusability. Cineca MDC Project is a case study for V-Must.net. The modelling of the Sala Bologna is proposed as a significant example of the issues dealt with in this new production pipeline which actually faces a twofold challenge: include philological constraints inside a traditional 3D movie pipeline production and test the multi-disciplinary ability of three-dimensional reconstructions to support both communication and research activities. (Guidazzoli, 2011: 2)

closed pattern in a closed space, with no way for interaction. However, as it is located in a museum gallery and is projected by a 3D projector in a real virtual theatre, even without using all the interactive features of a 3D interactive virtual theatre, it will fit in the category devoted to virtual museums enhancing museum exhibits. It is remarcable to note that the commissioning of this virtual theatre inside the *Genus Bononiae Museum* was the same as that of the University of Bologna's *Museum of the IX Centenary*, where the former Rector Fabio Roversi Monaco and the former President of the Carisbo Foundation, now President of *Genus Bononiae Museum*, both asked for something stunning, wonderful and amazing in 'their' museums.

This gallery in *Genus Bononiae* and the *MuseoTorino* represent more advanced examples of virtual museums introducing refined patterns of interactivity with heritage and users. Even though they are contemporary in their realization, they are located at the extremes of a line of interactivity (*Genus Bononiae* virtual theatre – passive; *MuseoTorino* – interactive), in a very different type of medium (*Genus Bononiae* – presential 3D cinema, *MuseoTorino* – the website).

Consumption of contents in virtual theatre is passive; in *MuseoTorino* it is active, as two very different types of media: cinema and the web. Given the fact that they are both based on two media (McLuhan, 1967; DeFleur, 1989; Flichy, 1991). In addition to this, both examples are part of a wider museum: the *Genus Bononiae* virtual theatre is a gallery in the building of the Museum of the City of Bologna dedicated to the history of Bologna in the time of the Etruscans. The *MuseoTorino* website is a part of *MuseoTorino*, consisting of the city of itself, a website, an app and an 'interpretation centre'.

What could be comparable in this case of a museum study is visitor experience. There is a broad literature on the evaluation of museums (Hooper Greenhill, 1999), mostly investigating the efforts of museums in the field of education (see i.e. the studies of Hooper-Greenhill) and there is a field of analysis within museum studies devoted to this. In my research I have found certain approaches using the observation of visitors inside a gallery very interesting (see i.e. Ciolfi, 2004) and also methods and software devoted to this mission, such as the Miranda method, developed by the Fitzcarrando Society[81]. However, given my definition of museums, and the important role of amusement, over educational roles and my personal interest in subjective methods of analysis, I have decided to examine objective indicators of the museum experience inside a virtual theatre and a website; that is to say the length of the visit, and the space that was 'covered' in both the examples, in a similar way to other museum evaluation tools that are not based on the impressions of visitors themselves. If a visitor spends an hour in a gallery, looking at a single picture and another visitor spends an hour in the same gallery, looking at all the objects on display, reading all the captions or taking a tour with the aid of a guide, then the goal of the museum to educate, but also to surprise, enjoy and entertain visitors can be said to have been performed (Silverstone, 1992).

So, in this comparison between the *Genus Bononiae* virtual theatre and the *MuseoTorino* website what interested me was the experience of the visitors inside those two virtual museums, as obtained by objective indicators as the time spent and the 'space' covered inside the two galleries. The purposes or results of this space and time journey inside the museum are not *objectively* measurable at all.

I had the good fortune to stay in touch with Massimo Negri, the Scientific Director of

[81] http://miranda.fitzcarraldo.it. Retrieved on 01-06-2014

Genus Bononiae who gave me the possibility to make the following recognition. *Genus Bononiae Museum* is unique in the world due to its virtual theatre, a singular example for the study of the relationship between a tangible museum, perhaps even a diffuse museum that describes itself as "*a cultural, artistic and museum itinerary running through buildings in the historical centre of Bologna*"[82] that have been renovated and rehabilitated for public use, and the most ambitious and rare example of virtual reality: the virtual theatre.

The experiment consisted at first in carrying out a peer-review of the visitors of the *Genus Bononiae Museum*, their number and the length of their stay inside the exhibition, comparing that peer-review with the statistics from the *MuseoTorino* website.

Given my theory that the museum is a medium that has space as its channel, I wanted to find out how many of the visitors to the museum physically enter the virtual theatre, and whether they stay to see the whole film. Personally, and also because of my belief in the HARritage project, I am quite sceptical about peer-reviews that try to get impressions from visitors. Antinucci's peer-review at the Vatican Museums in Rome is also of interest here (Antinucci 2004). Antinucci in fact proved in a peer-review taken for a huge sample of visitors leaving the Vatican Museums that people were often unable to recognize what paintings they have or have not seen, basing their knowledge on false memories or a general ignorance of the history of art. My research therefore concerned the physical occupation of the space, and I considered the time spent inside the theatre as equivalent to a virtual 'walk around a gallery'.

The experiment at the *Genus Bononiae Museum* took 15 days, between 21 February and

[82] Official brochure of the Museum.

6 March 2013, and involved all the visitors to the museum that also decided to visit the virtual theatre, 799 in total. Given my assumption that they all had to follow the 'corridor', because space is the channel of the museum, I measured the time that people spent in the virtual theatre, whether they stayed for the whole projection or if they left before the end[83]. This was very simple to measure, because as the 3D movie requires 3D glasses to be viewed, the ushers noted when the visitors returned the glasses. This is because the visitors can also enter, have a look and carry on, in the case that they did not feel like watching the whole film. It was not possible to count all the visitors who passed the virtual museum and decided not to enter. This fact will become important further on.

Space and time are dimensions, and for me the shift between space and time is possible. Space and time can be compared because new scientific (philosophy and physics) theories are going in the direction of considering space and time as a continuum (Barbour, 2000; Hawking and Penrose, 2010; Barrow, 2010; Lachièze Rey, 2006). So looking at the data that I have presented it is possible to make a switch and consider the time spent in *MuseoTorino*, instead of space, also taking into consideration data traffic; this provides us with data on the quantity of information absorbed from the virtual museum. Further analysis about the 'space', or cyberspace covered in the time at the *MuseoTorino* will be discussed below.

[83] This shift between space and time will be better explained as part of the conclusions.

Here are the data for access to the virtual theatre at *Genus Bononiae* over 15 days

DAY	VISITORS TO THE THEATRE	TOTAL OF VISITORS AT THE MUSEUM	TIME SPENT IN THE THEATRE
Thursday 21 feb	21	95	13 minutes
Friday 22 feb	23	59	13 minutes
Saturday 23 feb	62	154	14 minutes
Sunday 24 feb	73	113	13 minutes
Monday 25 feb			
Tuesday 26 feb	70	87	13 minutes
Wednesday 27 feb	85	138	13 minutes
Thursday 28 feb	66	128	13 minutes
Friday 01 mar	38	49	13 minutes
Saturday 02 mar	122	229	13 minutes
Sunday 03 mar	110	174	13 minutes
Monday 04 mar			
Tuesday 05 mar	32	55	13 minutes
Wednesday 06 mar	97	66	13 minutes

Table 27. Access to the virtual theatre at Genus Bononiae

For *MuseoTorino* I consulted the statistics from the website, for the Museum of the City of Turin as well as the city of Turin itself. At first I looked at the data from one year of the history of the website.

At first I filtered the year's 157,349 visitors who had an average visit greater than 2 minutes. This is because the average visit is between 2.47 and 2.31 minutes during the museum's opening time; there may be visitors who are searching for other kinds of information than visiting *MuseoTorino* itself, also taking Schaller's comments into consideration (Schaller, 2002) on the average time in visiting virtual museum educational resources. However, another parameter could be applied here: the total K that the website traffic generates. This means the space, or cyberspace, that the visitor

'walks through', without involving the concept of time spent on the page. But here I must also consider that for a website, these two 'facts': time spent on a page and data traffic is deceptive: one browser may stay for an hour on one page, really paying close attention to it. And it is this important shift between space and time that I would like to explain in detail. In the example I described above, a visitor can spend one hour in a gallery, contemplating a painting, enjoying the wonder of the artwork in all its detail. From the data from *MuseoTorino* that I have examined, a visitor opening a page of a digital object and contemplating the details, enjoying the wonder of the object cannot be measured. Even in a tangible museum a person can go and sit in front of a painting and read a newspaper, but in this case the observer or the person performing the peer-review can have a perception of what is happening and change the result of the study for that case. There is also the issue of the speed of the visit, as invoked by Dean by dividing the visitors to a museum in three categories: "*people who rush*", "*people who stroll*", and "*people who study*" (Dean, 1994: 25-26). However in my study, and due to the nature of Google Analytics, I cannot know whether visitors that spend more time in *MuseoTorino* are really browsing and reading/observing the web pages, or if they are doing something else. Other visitors may tour the whole website, even downloading it in a cache, without paying any attention whatsoever, or there may be a bot (such as search engine bots) that makes statistics. As Antinucci noted (2004) there are several ways to explore museum galleries, and running around the galleries is a quite different experience from walking slowly, reading all the captions, taking time for wonder and learning.

The indicators 'cyberspace' and 'cybertime' spent in a website of a virtual museum from statistical tools are deceptive, but they are the most common data used to evaluate whether a website works for the its stated aim; given the fact that the statistical

programme used by *MuseoTorino* (Google Analytics) does not provide data traffic of data, only page views and time spent on the website during the visit, I decided to opt for time, according to the data from the observation of the *Genus Bononiae* virtual theatre.

Making the comparisons, the *Genus Bononiae* virtual theatre has an average of 66 visitors a day. It is also important to note that, in addition to the entrance fee to the museum, visitors wishing to enter in the virtual theatre must pay an additional 10 Euros.

The average data for *MuseoTorino* is more difficult to process, because the only data that the institution were able to provide were Google Analytics for the website, thanks to Daniele Jalla, *MuseoTorino* director, and Gian Luca Farina Perseu, responsible for the website. Many visitors reach only the first page: this is the same as saying that a person arrives at the entrance of a museum and decides not to enter. It was not possible to count all the people that pass in front of the *Genus Bononiae Museum* and decide not to enter. Also because a website can be accessed from anywhere, it is much more difficult for someone to decide to go to *Genus Bononiae* in order to enter the museum and then decide not to do so. This lies in people's intentions and is therefore not measurable. However it was possible to have the data of all the visitors to *Genus Bononiae Museum*, including those who decided not to enter the virtual theatre (and not to pay the additional fee).

As for the virtual theatre, where I examined the amount of visitors taking a look inside the theatre and passing by without deciding to enter, I will compare the data with that from the *MuseoTorino* website, without measuring home page visits and visits viewing less than 2 pages, because this is similar to a visitor passing the virtual theatre without entering. The section of the website that is the museum itself not including the home page was most relevant.

In this case we have a direct comparison between the 7,524 persons that viewed only one page of *MuseoTorino* in 15 days, and the 54 visitors to *Genus Bononiae* that decided not to enter the virtual theatre. Both figures are very different, and stress the potentiality of global participation that the web has introduced in our lives and in the field of study of virtual museums.

However, this comparison, as I have already mentioned, is not 'real', so I have decided to skip all the data for *MuseoTorino* indicating that a visitor has accessed less than 5 pages, so *MuseoTorino* visitors (also for one page) in the period of observation stand at 1,549, around 103 per day. If we take as a comparison the time spent in the virtual theatre (all visitors have seen the whole movie), and we compare this data with the visitors that viewed more than 20 pages in *MuseoTorino*, 424, we have for *MuseoTorino* an average of 28 'actual' visitors per day. Comparing this number with the frequency and duration of the visit, we can discern a difference between an 'occasional' visitor, someone who takes a look and then leaves the page, and an 'actual' visitor.

Due to the fact that visitors to *Genus Bononiae* and *MuseoTorino* visit the museums in such different ways, it is necessary for me to make a comparison of numbers, and to do so I will skip all the people at *MuseoTorino* who have spent less than 600 seconds on the website, starting the comparison of *MuseoTorino* and *Genus Bononiae* only with those persons that spent more than 601 seconds at *MuseoTorino*. In this way the average figures are 66 for *Genus Bononiae* and 48 for *MuseoTorino*. Those two numbers, given the total amount of visitors to both museums, are both similar and substantially comparable, making for the same results, meaning that the taxonomy of my six

categories of virtual museums show similar examples of the same phenomenon: virtual museums, considered in their diversity, such as the examples I gave as categorized as different manifestations of a same whole.

What is important to note in the comparison between *Genus Bononiae* and *MuseoTorino* for me are not the figures, but the shifts between space and time, as the channels (what interests me is the fact that they are objective and measurable channels) of the virtual museum as a medium: time can be understood as the time passed inside the interactive gallery or in browsing a website. This variable must be compared in some way to space: the space covered in the interactive gallery, or quantity of K, of data traffic, generated by the website. These two indicators are highly similar to other ways of evaluating museums, in a wider field of analysis that also involves active observation of visitors in museums. In my comparison, I would like to provide museum professionals with basic tools for the analysis of virtual museum websites, similar to Google Analytics. I appreciated very much the aforementioned studies on the evaluation of visitor experience inside virtual museums, conducted highly scientifically. Many were generated by a precise profile action of visitors for the interactive resource through a peer-review.

The situation of museums in approaching different ways to communicate heritage from my point of view as a museum professional is in some cases critical: there is a generalized lack of funding and museum professionals' awareness of technology is often lacking. Or there may be many situations where the awareness is there, but lack of funding means that a serious evaluation study of visitor experience in the virtual museum must be postponed to an unspecified date. My comparison aims to provide a fast, simple but structured analytical base for museum professional to evaluate the

efforts of virtual museums, whether this consists of a website, a learning resource, an interactive gallery, an example of my categorization as a base for more detailed studies.

This comparison, proving the validity of my taxonomy, may generate further studies: on the validity of my meta-model, but also as a realistic and practicable way for museum professionals to evaluate the impact of virtual museums at this critical historical moment.

3.12 Mapping exercise and further studies

During the peer-reviews we tried to figure out how the different examples of virtual museums can fit inside the taxonomy. At the same time the peer-reviews with participants became a starting point for the changes in my taxonomy, such as the 2.0 version in this research work. It became important to perform a mapping exercise for grouping the feedback together, and qualifying the experts that provided it.

As is shown in figure n. 7, it is relevant that it is mainly museum professionals who find my taxonomy useful, even in its 1.0 version as a 'working model' for the classification of virtual museums, and on the other hand, academics and researchers try to figure out exceptions, or suggest new avenues for study.

I hope that the 2.0 version of my taxonomy will find favour with the academics as well as museum professionals.

During the mapping exercise with the experts, on trying to figure out whether their work would fit in with my taxonomy or not, and also following the suggestions of Paolo

Paolini and Luigi Maria di Corato, I found it interesting to note two things as shown in figure n. 8. The first was that in the hypothetical Cartesian graph of my categories the quadrant of 'closed interaction' in an 'open space' was empty. Trying to figure out where the suggestions of Paolo Paolini and Luigi Maria di Corato of 'blended experiences' and the use of Google Glasses could fit, I discovered that they fit exactly in the quadrant of closed interaction in an open space. Further research into my theory can also fit in here, in accordance with of the two year time frame proposed by Lucia Cataldo, and the introduction of Google Glass hoped for in a few months by Di Corato.

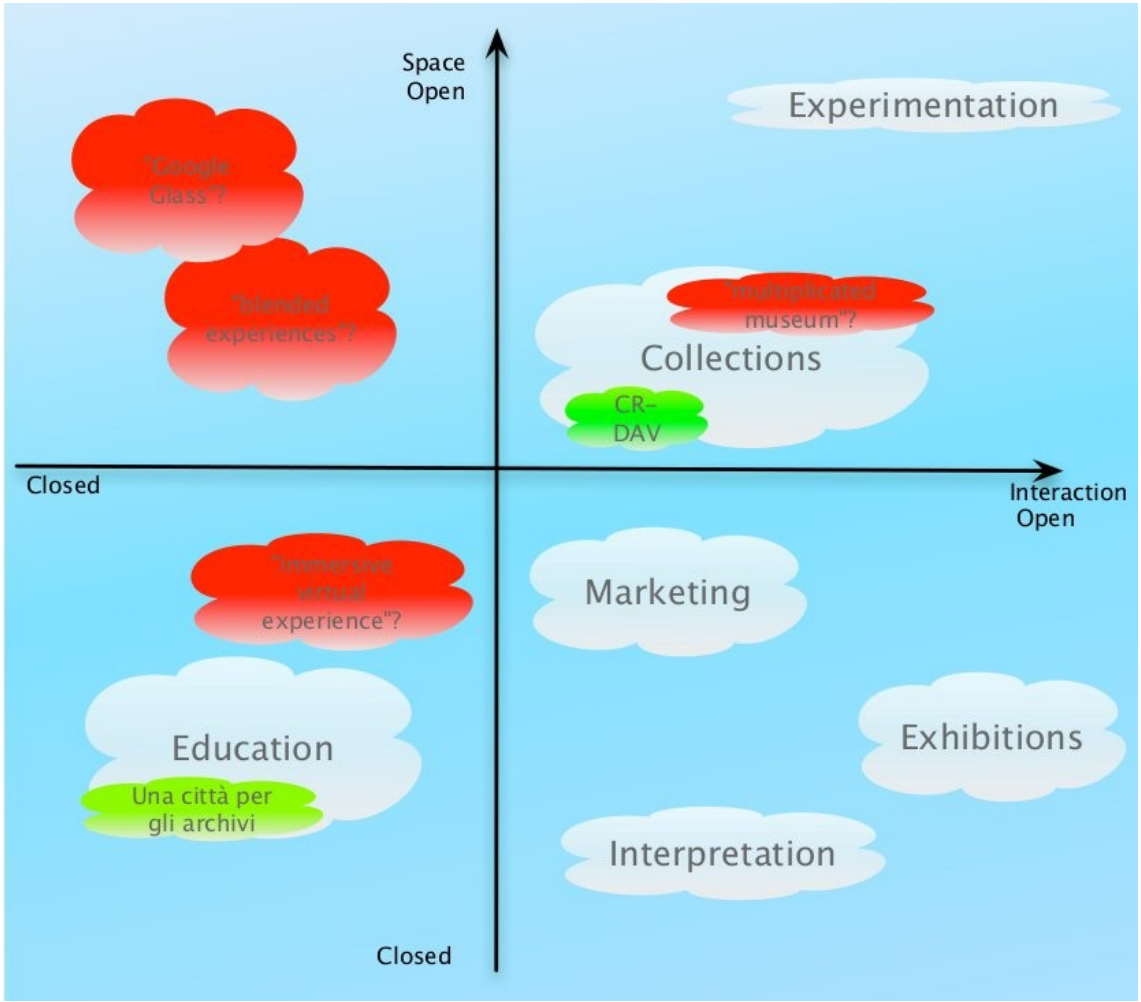


Figure 8: Mapping categories. Simona Caraceni

However, one limit on my taxonomy emphasized by the peer review and the mapping exercise is not to consider this 'intersection' between a 'closed interaction' in an 'open

space': I think that after a greater use of blended interaction gesture based devices and also of Google Glass this gap will be filled after the creation of another category, suggesting further studies on this question in the future. In fact my drawing and the table that describes every category, considering augmented reality in the field of cultural assets, already contain applications that provide closed interaction (through a gesture based device interface) in an open space that may be the space of a city or a region permitting this kind of interaction. There are also applications that are intended to be used inside a museum gallery or natural areas or archeological sites, that can be considered as closed gesture based interaction, in a closed space, as described in the table below.

NEED	MARKETING/Education/Collection
INTERACTION	Closed (gesture based; portable devices)
SPACE	Closed/Open (?)
CONTENT	Selected objects of the museum collection presented as (Digital) images, texts, audio, video, 3D models
VIRTUAL/REAL	Virtual on real, real with virtual, virtual with real
VISITORS CONTRIBUTIONS	Not allowed/allowed

Table 28. Augmented reality in cultural assets field

In the past, in version 1.0 of my taxonomy I considered experiments in augmented reality as part of Category F because they were experimental technologies. Now this kind of technology has been widely adopted, but as Luigi Maria di Corato and Paolo Paolini note, we tend to consider them as a reality due to the fact that they work through state-of-the-art technology, although it is my belief that we need more time to study the real-life examples adopted by museums. Another reason is that my taxonomy is based on the communicative need of the museum, and not on technology, in the way that V-

Must's taxonomy of virtual museum is, for example. And so, as the above table shows, the communicative needs of certain examples of augmented reality or blended technology applications in the virtual museum field can be made to get round the different communicative needs of museums (such as, for example, Biennale Augmented reality layers on Layar[84], or Ultimate Dinosaur app[85], or Rome VMR app[86]). Further studies into this field are needed.

As I have already explained earlier in this work, my taxonomy was the best way I could find to group the hundreds of virtual museums that I have come across over nine years of study. Research into this topic could also have been carried out in different ways, without using the taxonomic tool.

Had certain limits of technological 'instability' not been reached (D'Ambrosio and Parrella, 1998: 140) for most of the examples of virtual museums that I surveyed in my catalogue-table, another way to conduct this research could have been merely encyclopedic: I would have had to forewarn at the beginning of the research to preserve the examples of museums on CD-ROM, with screenshots using operating systems capable of being supported 10 years into the future. This work would then have been conceived as an encyclopedia, leaving to others the daunting task of extrapolating the different categories aiming to define the multiplicity of the phenomenon of the virtual museum from the hundreds of reported examples. Historical examples of this attempt include the Museumland website[87] when the term 'virtual' is searched, returns report almost exclusively that the sites are unreachable or no longer active, as is the case of the

[84] http://manifestarblog.wordpress.com/cleater-venice-2011/. Retrieved on 01-06-2014

[85] https://www.youtube.com/watch?v=vqW9t27-OzQ and http://www.rom.on.ca/dinos/channel/ar.php. Retrieved on 01-06-2014

[86] http://www.altair4.com/videos/applicazione-iphone-roma-mvriphone-app-rome-mvr/. Retrieved on 01-06-2014

[87] http://www.museumland.net/ricerca_globale_en.php. Retrieved on 05-12-2014

old ‘Virtual Tours’ website[88].

However it was precisely the instability of many cases of the virtual museums that I came across over the years that validated my definition and helped me to find the categories capable of embracing the complexity of the phenomenon without going into purely technological issues that would been incomprehensible for the majority of the community of museum professionals with a background in the humanities.

Another way to formulate this research could have been to use all recorded definitions of the virtual museum as a starting point, going on to show how each one could exclude the examples of virtual museums recognized by the academic and professional communities, gravitating around museums. This could give rise to a new and different definition of the virtual museum in further studies, in spite of my membership of ICOM, where its Code of Ethics[89] requires me to place the official definition of museums before any others.

Or, in another case, all the definitions of the virtual museum could have been or could be presented to the world community that could then ‘vote’ on the most fitting definition, thus creating another peer-review integrating data from cases as yet uncovered by the different definitions, creating collectively and collaboratively a new definition, which would also be reviewed every two years, following the trends for the increasing adoption of new technologies, making the virtual museum into a ‘living’ concept, as ‘alive’ as the concept of the museum that has evolved in the history of ICOM definitions.

[88] http://www.virtualfreesites.com/museums.museums.html. Retrieved on 01-06-2014.
[89] ICOM Code of Ethics: http://icom.museum/the-vision/code-of-ethics/. Retrieved on 01-06-2014.

3.13 Conclusions

In this main chapter of my thesis I have discussed my attempt to create a taxonomy of virtual museums with the intention for museum professionals to understand the nature of the 'virtual museum' phenomenon. As was explained in the methodological introduction, my taxonomy comes from the direct observation of examples in my 9 years of PhD research and 7 years of active membership in AVICOM, as Coordinator of the 'Audio-visivi e nuove tecnologie' commission in ICOM Italy and as a member of the executive board and vice-president of AVICOM International.

The study starts from the observation of the practices of virtual museums, and aims to be easily understood by museum professionals with no background in IT or Computer Science and to be of help in planning a virtual museum. It is centred on the actual and potential needs of museums that may be satisfied through the use of technology. As it involves complex theory and because my taxonomy as do all taxonomies, involves science, there may be some paradoxes that cannot fit exactly in any of my categories, remaining either on the borders of the classification or outside them. It must be observed in conjunction with my definition of the virtual museum, and as a meta-model in evolution, useful for museum professionals in order to understand and practice and to be reviewed over time, to be confirmed or updated by new experiments and practices in virtual museum studies.

A first draft of my taxonomy was proposed to a group of AVICOM and ICOM museum professionals and academic peers, reaching its current state as a 2.0 version. It is planned to exist in a 3.0 version in the years to come, with the same aim of observing and describing the practices of museums through experiments.

Examples of the six categories were chosen for their interest to museum professionals, especially the two examples of the final comparison between two very different virtual museums, to prove that even a 3D passive movie inside a virtual theatre and a collaborative web city museum can exist in the same container-taxonomy-meta-model.

As has been suggested by the peer review, further studies are needed, and will be undertaken in proving the validity of the theory in 2 years' time; also for considering experiments in emerging technology such as 'blended' technology, augmented reality and Google Glass experiences.

IV. Challenges for museum professionals

4.1 Introduction

In this chapter, shorter than the preceding ones, I intend to trace the definition of further research into how museum professionals can deal with the application of new communication technology in order to enhance the consumption of heritage, the main goal of my thesis.

I will also introduce my experience at AVICOM that has been crucial for my understanding of complex scenarios such as the changes in the way museums communicate, my time on the Executive Board and my election as vice president, providing me with a wide and comprehensive vision of the situation of museums worldwide.

This practical activity permitted me to get acquainted with the changes that museum professionals have to deal with concerning new means of communication for museums, given new technology and the new role of museums and virtual museums as media. I expressed and discussed my thoughts with other members of AVICOM as well as ICTOP. These suggestions are relevant not only because they have been discussed and accepted in international contexts, but because a museum is also made by the people that work there every day and put their passion and efforts into the profession that I consider the best in the world.

4.2 Activity at AVICOM

AVICOM, established in June 1991, is ICOM's International Committee for Audio-visual and New Technologies of Image and Sound and one of ICOM's (International Council of Museums) international committees. The Committee members are curators, scientists and technicians in charge of collections and those responsible for the services using audio-visual and new technologies in museums and heritage and cultural institutions. Private professionals are also involved as consultants.

The Committee depends on patrons and on grants, seeking its own sources of funding in order to be able to carry out its mission.

The AVICOM Committee has a varied mission that is:

- to advise museums and make museum professionals aware of and better informed about the usefulness and potential of audio-visual and new technologies, in terms of education, information, promotion and business activities;
- to recommend that audio-visual technologies be included in equipment, operating and cultural event budgets;
- to study the legal and financial framework with respect to images, sound, audio-visual and multimedia productions as well as cable and microwave network broadcasts;
- to peer-review institutions, collections, techniques, outputs and productions, as well as databases and data banks;
- to promote knowledge of the conservation methodologies for all kinds of audio-

visual and digital records;

- to promote knowledge of the history of techniques, and to encourage the creation of exchange networks and the study of how audio-visual technologies are used.

A general meeting of the Committee is held every year in a different host country, on a specific theme and including a variety of events (symposia, professional days, festival). A useful tool not only for information but as a way of encouraging debate and exploration[90].

I started my activity in AVICOM in 2007, the first year that I became a member of ICOM. I had a great interest in this committee, because as can be seen in the aims and mission, it lies exactly within my field of interest. Thanks to Daniele Jalla, former president of ICOM Italy, I was a member of the jury for the FIAMP festival held in Turin in 2009.

> *FIAMP is an international professional event designed to promote the achievements of museums making use of new image and sound technologies. It is a competition refereed by an international jury of experts that is held in a different country each year in conjunction with the AVICOM committee annual meeting which takes place at its international conference.*[91]

As part of the jury and participating in other FIAMP festivals as Montreal 2012 I had an overview of the real audio-visual and multimedia production of museums, and what museum professionals intend when they want to enhance heritage using technology, with a very different point of view from most IT professionals. I was elected to the Executive Board in November 2009, and part of my activity consisted in supporting the President, Manon Blanchette, in the organization of the annual conferences, held in Montreal in October 2012 and in Rio in August 2013. In December 2013 I was elected

[90] http://avicom.icom.museum. Retrieved on 01-06-2014

[91] http://network.icom.museum/avicom/fiamp-festival/presentation/L/10/. Retrieved on 01-06-2014

vice-president of AVICOM. Concerning research, my thoughts inside this organization were about how information technology and the use of social networks change the everyday work of museum professionals.

In addition to my AVICOM activity, in 2007 I promoted the creation in ICOM Italy of a thematic commission coordinating AVICOM members in Italy, with the aim of providing assistance with the adoption of new technology in museums. I was elected as national coordinator in 2010, and then in 2013, up to 2016. This national activity, more intense than the international activity of AVICOM, permitted me to confront the real needs of museums in communicating heritage.

4.3 The challenges of museum professionals in communicating heritage

I would like to introduce here some notes on the role of museum professionals in the years to come. It is common nowadays to make a heavy use of technology with new technology leading museum projects, but in my opinion strong communication projects are also needed beside the use or non-use of technology for the communication of heritage.

> *If the 20th century was primarily about collecting, I believe the 21st is about programming. This project*[92] *is not about collecting anything. It's about engaging in serious research that results in vibrant public programs. Our goal is not so much to be the change agent, but rather, to create the kind of conversation that might lead at some future date to change by addressing critically important problems that engage specialists within the field as well as a more general public.* (Glen Lowry, director of MOMA, New York, in Cembalest, 2001)

The words of the director of New York's Museum of Modern Art are a great inspiration to all of us working in museums, in understanding the direction to be taken by museums

[92] http://www.moma.org/explore/inside_out/2011/06/09/foreclosed-rehousing-the-american-dream/. Retrieved on 01-06-2014

of any size and in any initiative to be faced.

Taking a closer look at the research conducted by the Whitney Museum of Modern Art into the question "What will museums be like in the future?"[93]; the results were unambiguous and can be summarized by not only by Lowry's quote but also from these other small excerpts that will guide us throughout this text.

> *I think (hope) that museums in the future will present opportunities for more technologically mediated forms of participation/interaction while continuing to maintain occasions for the traditional means of engagement as well. Visitors could be as plugged-in as they like—interacting with the art on view through social networks, learning more through their handheld, perhaps even creating their own art/content onsite—but at the same time, listen to curators speak, read wall labels, and attend lectures. I think the tricky thing moving forward will be balancing a museum's institutional authority with the increasingly level playing field created through new technologies and the ever-growing cultural expectations for personalization, sharing, etc.* (Sarah M.[94])

There are three cues for the action of museum directors: using new technologies to reinforce the action of the museum as an agent for change and renewal of society, powered by the interaction between visitors and the museum. Can this be done through new technologies?

For comparison, the best contemporary marketing campaigns using technology and social networks to date (30 September 2011) are those of Old Spice[95], and Home Plus in Korea[96] illustrating the accurate, meaningful and successful use of QR codes (commonly used in Augmented Reality, although they are now becoming obsolete due to the technological development of Layar software).

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93 http://whitney.org/WhitneyStories/WhatDoYouThink?tbid=82. Retrieved on 01-06-2014

94 http://whitney.org/WhitneyStories/WhatDoYouThink?tbid=82. Retrieved on 01-06-2014

95 http://www.youtube.com/user/ OldSpice http://mashable.com/2011/07/26/old-spice-guys-youtube/ and the agency has also created http://www.wk.com/office/portland/client/old_spice and http://gigaom.com/video/the-viral-genius-of-wiedenkennedys-new-old-spice-campaign/. Retrieved on 01-06-2014

96 http://youtu.be/o9zcs1dg8qo. Retrieved on 01-06-2014

4.3.1 A specific case study on the new challenges facing museum professionals

The online community of museums and art-lovers know this story as a textbook example of a viral advertising 'guerrilla marketing' campaign, started from the bottom up, by people who were not part of any commercial agency or institution, for the love of culture and museums. I'm talking about the campaign 'Historically Hardcore'[97] involving the Smithsonian, a very important association of museums in the United States, which is also very active in social networks. Two students, Jenny Burrows and Matt Kappler, art director and copywriter, respectively, of this home-made advertising campaign, created the poster as a work portfolio for the art school where they were studying. Their aim was try to talk the language of young people, by comparing great names from history with contemporary rock stars or musicians to make them aware how history is always present.

The slogans of the three posters read: "*50 Cent got shot and still whines about it on stage*"; "*Teddy Roosevelt got shot mid-speech and didn't leave the stage until he finished*"; "*Ozzy Osborne's dirty language rubbed off on his kids*"; "*Andrew Jackson was so vulgar his parrot was ejected from his funeral for swearing*"; "*Bret Michaels got with every chick on the love bus*"; "*Genghis Khan got with so many chicks there's a 5% chance you're related to him*". The phrases appeal to the young, and the graphics of the posters are aesthetically pleasing and totally plausible with the graphics of the Smithsonian. After the posters were published online, they spread virally throughout the

[97] http://dcist.com/2011/03/historically_hardcore_posters_too_c.php. Retrieved on 01-06-2014

Internet. Jenny Burrows, one of the two authors, wrote on her blog:

> *At first it was really cool, seeing the ads on different blogs, seeing people tweeting and commenting on the posters. I started to follow the tags for 'Smithsonian' and 'Historically Hardcore' on Tumblr and Twitter, watching people talking about advertising, because they thought they were real, and they were proud of the fact that an institution like that would really do something unconventional with their own advertising campaign. I tried to correct as many people as possible, (saying that the poster was unofficial, but they had made their own), especially when the ads began to crop up at more institutional sites (without realizing that this was not a real campaign conducted by the Smithsonian). And then on the evening of March 20th someone posted the posters on Reddit (the 'blog of blogs' that controls what is spoken about all over the planet,). That was it. I was chatting with my brother, a rule-King on Reddit when I saw a tweet pointing to a thread on my poster. I told my brother: "Hey look, I'm on Reddit! That's it!". That post, and then another with my posters were the first and third most discussed posts on Reddit's home page in the world! The next morning, March 21st, I started receiving phone calls from agencies in Washington, DC. It was after the first call I decided it was probably time to get in touch with someone at the Smithsonian, to clear things up. They were not very happy with all the attention on the posters and wanted them taken down from the Internet immediately. Honestly, I do not blame them. If someone put something out there with my name on it, I would not be too happy about it either, even if I did get global acclaim. I apologized, eliminating all traces of the museum's logo, their name and everything else I could. The posters were posted on DeviantArt, one of best places to find creative work on the Internet, where, through this site, the posters could be printed for a fee. However, I also removed this after my interview with the Smithsonian.*
>
> *It was awesome, amazing to see people's comments on the posters. Our goal was to connect with high school and college students, to try to engage them with a subject that many of them found extremely boring. To encourage them to learn more about historical figures they tended to see as stiff and boring. And I think that I can say without a shadow of a doubt that if this had been a real campaign, it would have been an immense success.*
>
> *I have seen so many people making comments, saying things like "I want to go to the Smithsonian now!"*[98]

and "*History is fantastic! I want these on my wall*". It's nice to know that a clear concept can really get people going. I think that this shows that campaigns do not need to be highly effective technologically in order to attract attention. Of course, the social media were the impetus behind the spread of this massive project, but they were just simple posters.

[98] http://jennyleighbee.blogspot.it/2011/03/historically-hardcore-amazingly-awesome.html. Retrieved on 01-06-2014

The Smithsonian has removed its logo from all the above images on the Net.

This case study asks specific questions to all museum professionals. These students were not trying to curate an exhibition, or to do what museum professionals do to promote heritage: they wanted to share the beauty of history with their friends, to enhance participation and deeper knowledge of history among their peers. Why did the Smithsonian, a very important and up-to-date institution in US and in the rest of the museum world stop this conversation? Why did they not use this opportunity to endorse those trying?

How can museum professionals cope with this kind of interaction with the public? How can they be prepared for conversation with the public? How can curricular guidelines[99] for museum professionals be enhanced to deal with special cases like this?

4.4 Organizational impact and sustainability of online presence (social media) for museums and/or archives

What will art museums be like in the future?

Open. (Man B.)[100]

In this part of this brief chapter of my thesis I will examine the practical implications of new, technological means of communication for museum professionals, and how they cope with concepts and practices that were unheard of for previous generations. Not only in Italy, but also in other parts of the world, the crisis in the heritage sector also implies the lack of alternation between professionals. This depends on the fact that when a professional retires, there is neither the will (nor economical availability) for

[99] http://museumstudies.si.edu/ICOM-ICTOP/. Retrieved on 01-06-2014

[100] http://whitney.org/WhitneyStories/WhatDoYouThink?tbid=82. Retrieved on 01-06-2014

him or her to be replaced. At the end of the day it means that those who have the culture and awareness to use social networks and new technologies well ('digital natives') do not have the means to do so along with 'older' users, also known as 'digital immigrants' (Prensky, 2001).

In this scenario it is important to me to offer some advice to museum professionals, in order to put in the right perspective the ways that new technology can be a real aid for the aims and functions of museums, and to sort out some commonplaces about new technologies.

Malraux's notion of the musée imaginaire is, in fact, another way of writing 'modernism', that is, of transcoding the aesthetic notions upon which modern art was built: the idea of art as autonomous and autotelic, the sense of it as self-valuable, the view that is summarized as *l'art pour l'art*.

New technology also means community data, a way to be an actor in the production of meaning. This is one way in which institutions dialogue with citizens, and in this particular case, the object of the communication is heritage and art. For many years institutions have tended to impose culture from above: in this era of sharing, of social networks, the idea that citizens are also city users has become important, and so more than simply sharing contents, they start to become producers of meaning, producers of contents interpreting heritage itself.

The principal change is the relationship between institution, visitor and object. Museums are now expected to display objects in such a way (exhibition) as to be suitable for communication (transposition) to the public (tags, explanatory tags etc., so when the museum is virtual this institutional transposition varies in degree, but also in

nature, because it can create digital replicas, not only for objects, but also for the architecture / architecture of information, as representation.

So the virtual museum has changed its institutional status and has started to take on a knowledge transmission system that is at risk of differing from ICOM's definition of the museum because, for example, it cannot have the conservation of heritage itself as an aim: it could have the conservation and preservation of digital information of heritage as an aim, but not the preservation and conservation of material objects, the artefacts, as McLuhan called them. And to continue in this direction, the roles, functions and education of museum professionals is also changing into something new; there is also a gap between the education and training of museum professionals and what they are expected to do in the field of communication and technology.

ICTOP is the ICOM Commission whose primary aim is to promote training and professional development and to establish standards for museum staff throughout their careers. Between 2006 and 2008, the Italian ICTOP group worked together with similar groups in Europe on a project leading to the final draft of the 'A European Frame of Reference for Museum Professions'.

This document outlines the professional framework[101] required for a good museum, assuming that the working group has identified a list of 20 skills: this number represents the minimum organization required by a large museum. Smaller and medium

[101] Museum Professions – A European Frame of Reference, edited by Angelika Ruge, President of ICTOP, http://www.icom-italia.org/index.php?option=com_docman&task=doc_download&gid=225 for integration with international codes http://icom.museum/what-we-do/professional-standards/professions.html. Retrieved on 01-06-2014

institutions will work within a professional framework in accordance with their functions and financial means. External and internal conditions and the mission of museums represent the framework within which these decisions are made.

In this document[102], which I invite you to read in its entirety, along with the ICOM Code of Ethics that every museum of any type and size[103] must adhere to in order to be considered a museum, it is evident that three years (2008 to 2011) are an eternity, given the breakneck pace of information technology.

The only professions dealing with new technologies in museums are the following:

IT MANAGER

Description

The IT manager plans, maintains and manages computers, networks and software as well as digital media systems.

- *He/She is committed to developing the computer network to improve in-house data management and external communication.*
- *He/She enforces security of access and data preservation.*

Education

Graduate degree (first cycle; Bachelor) in information and communication technology.

Additional qualification

Relevant experience.

Note

Depending on the size of the museum, this position may be linked to that of facilities manager.

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[102] Ibidem, p. 11.

[103] http://icom.museum/what-we-do/professional-standards/code-of-ethics.html and http://icom.museum/fileadmin/user_upload/pdf/Codes/italy.pdf (in Italian) international museum standards http://icom.museum/what-we-do/professional-standards/standards-guidelines.html and http://www.icom-italia.org//index.php?option=com_content&task=view&id=291&Itemid=197 (in Italian). Retrieved on 01-06-2014

PRESS AND MEDIA OFFICER

Description

The press and media officer develops and implements strategies to make known the mission, targets, contents and activities of the institution through all media.

- *He/She co-ordinates and assists the professional staff of the museum in their relations with the media.*
- *He/She develops and maintains a network of media professionals.*

Education

Postgraduate degree (second cycle; Master) in journalism, communication or public relations.

Additional qualification

Substantial experience of cultural communication

WEBMASTER

Description

The webmaster works with the press and media officer to design and develop the museum's web site.

- *He/She updates the site and manages the relation with the internet provider in co-ordination with the IT manager.*
- *Reporting to the curator or exhibition curator, he/she creates virtual exhibitions.*

Education

Graduate degree (first cycle; Bachelor) or three years experience designing and developing web sites.

MARKETING, PROMOTIONS & FUND-RAISING MANAGER

Description

The marketing, promotion and fundraising manager reports to the director and is in charge of developing marketing and promotion strategies to increase the visibility of the museum, to increase and improve its audience and to find funds.

- *He/She provides activities and information so as to improve public awareness of the institution and of its role in society.*
- *He/She targets current and prospective audiences and develops suitable promotion strategies.*
- *He/She encourages broader involvement and engagement of the public (friends, volunteers etc.).*
- *He/She contributes to the financial development of the museum through*

fundraising.

Education

Postgraduate degree (second cycle; Master) in cultural or corporate management or economics

Additional qualification

Substantial experience in the cultural field

Listed in this way, it is significant the way these professions are being implemented in the new means of communication used by museums. Can the IT manager be replaced by the head of logistics? Can the Press and Media officer take responsibility for the museum's Twitter, Facebook and Google + channels without making the mistake of making a hard copy of the communiqué? Can the marketing manager take responsibility for web marketing and promotion strategies or for using the Augmented Reality tools available in the area? Has the webmaster received training in the creation of virtual exhibitions, or in ground-breaking Applications for mobile systems or Augmented Reality? These are some of the questions that we at the AVICOM Commission are making at an international level.

Starting from the most recent case studies (2011) of large museums such as the Getty, the Smithsonian and Monticello[104], it is crucial to implement a strategy bringing organizations to a new way of thinking, of conceiving themselves, as shown in the figure below.

At the Getty, staff working with the social media know that they must work with new channels for communication and cooperation: to make this happen organization must be

[104] http://www.museumsandtheweb.com/mw2011/papers/social_media_and_organizational_change. Retrieved on 01-06-2014

rethought. The problems in justifying and finding necessary funds, and defining new professions at the Getty are emblematic of how even now it is still difficult to categorize this new way of working in a museum (and in an organizations in general). Growing awareness of the media 2.0 involves three aspects. First, all staff should be able to identify the strengths and weaknesses of all platforms. Secondly, they must understand how social media can help organizations; social media strategy should be coordinated, discussed and shared within the organization. Finally, prospective copyright issues should be clarified along with the basic terms of legislative and company policy for the sharing of any materials in Social Networks.

The debate on sustainability must also start from the identification of the professions deemed suitable for taking responsibility for communication with Social Networks: IT staff? Marketing? Curators?

Concerning sustainability, as was noted in the beginning, the figures from European Frame of Reference for Museum Professions refer to large museums, with smaller museums being able to 'work in accordance with their functions and financial means' to decide whether or not to include these professions among their staff. What is happening now is that it is becoming increasingly urgent for museums of all sizes to communicate with the Internet and social networks; this is also related to the fact that it is often burdensome for museums to outsource these functions to external agencies. One risk is a museum's own communication strategy becoming a copy of other museums', even as customers of the same company, thereby completely losing their own cultural identity.

The case of the GoogleArt Project presented above is emblematic.

Assuming that the Museum websites have been created and outsourced, it is highly likely that the IT manager works for the contractor in question, with responsibility for the Intranet and technical support. However, in most cases he or she is not the best person for dealing with promotion in social networks, tending to be highly qualified in IT, but to a lesser degree in communication strategies.

Marketing managers on the other hand, will have responsibility for institutional tasks in promoting the museum; however it is rare to find specialists in Web Marketing, which is a fairly young discipline, in the field of marketing, (this is also true in higher education) with highly professional, precise syntax and tools, requiring skill and proficiency on-line for results that can be stunning.

As for the Press and Media Office, specific training is also required. It is very common for Museums to have a Fan Page on Facebook; however even with a high number of fans and supporters they tend only to include events related to the Museum, posting links or images relating to current exhibitions. As can be guessed, websites and newsletters, which are one-way means of communication, are not the best way to engage in conversation with Social Networks. For multimedia conversations, consolidated techniques exist, requiring young, enthusiastic and qualified staff.

Success stories abroad demonstrate the usefulness of external experts in Organization, Museums and Social Networks (the case of the Getty in 2011) which traced the lines of communication in social media and then trained specialized staff. In this case, the

external coordinator is not personally involved in the goals of the Museum, but this weakness can provide a different perspective on organizational strengths and weaknesses.

The Getty itself has also created a staff of 15-20 persons working in different departments with different responsibilities in relation to social networks; the number varying depending on the actual working hours required by staff for the task in hand: for example, technical staff may be involved in the launch of a campaign platform over several months. For this team it is useful to meet on a daily basis, using local media sharing facilities And for this purpose it has been very useful for the whole organization to have a wiki available on their Intranet to start thinking in a cooperative way. Staff, when properly trained, bear fruit.

Another organizational choice made by the Monticello Museum was to allocate resources to Communication on Social Networks. This choice, dictated by economic factors, has shown its benefits because the 'insiders' are already acquainted both with the museum collection and the organization itself, but has also presented problems: can one person do all the work? How can they be properly trained for the purpose?

One feasible organizational decision for smaller museums with similar requirements, collections etc. could be to join forces in a Museum System, thereby sharing resources, or investment in outside consultants for training or planning.

I would like here to share some guidelines for museum organizations on starting campaigns on social networks:

1. Trust and dialogue start with building up trust and dialogue with your visitors, trust and dialogue must be supported within your organization. Training, promoting awareness and internal cooperation will be reflected in external relations.

2. The successful centre-outward model. Internal coordination of communication with social media from within the museum always brings positive results. This leads the organization to move more knowledgeably and willingly in a horizontal cooperative model, while still obtaining results.

3. Social Media managers in museums should be recognized and valued. It is essential that the organizational role of the communications manager be formalized and recognized throughout the Museum organization. Only in this way will he or she be able to work for the common good of the institution and society in general.

4. Museum professionals face special challenges in communicating heritage in this century. As a conclusion of this short chapter, I hope that having an understanding of past experiments in virtual museum will help them, especially those working in smaller museums and smaller towns, to deal with the crisis that is financial but also involves a lack of communication.

4.5 General conclusions

The aim of this research was to fill a gap in museum professionals' understanding of the phenomenon of virtual museums. During the period of this research, I have found that this phenomenon has been thoroughly examined by specialists with a background in

computer science. Over the years, several research spaces for museum professionals have also come into being, including the Museum and the web, conferences, ICHIM and the AVICOM FIAMP award for the best applied software products applied to heritage. However there was no clear point of reference for museum professionals to understand the phenomenon of virtual museums.

With my research I have tried to use the reference framework of museum professionals, who mainly have a background in museum studies as part of the humanities, in order to convey the complexity of the conditions and effects of the application of technology in museums.

This research is firmly placed in museum studies, mainly in the field of humanities, as part of a research project of the Planetary Collegium, initially hosted by the University of Plymouth's Faculty of Technology, and then by its Faculty of Arts. My work began in the field of aesthetics and technology, and as is the practice in the Planetary Collegium, it contemplated a certain contamination between the two disciplines. As I carried out my research, I realized that although the phenomenon of virtual museums may have been exhausted from the point of view of technology, it was still lacking a clear and understandable approach to the problem from the Humanities. Therefore my research has focused on the arts, on what are commonly known as the digital humanities, and of course Museum Studies.

The taxonomy presented in this work takes the communication needs of virtual museums as a key to understanding the phenomenon of virtual museums, furnishing me with a heightened awareness of the museological paradigms that were the basis of the cases examined over my years of study and realizing that there was also a way to create this awareness among museum professionals, who in most cases have, due to their

academic background, a somewhat scarce knowledge of technology but a great deal of experience in communication and cultural heritage.

Examples of the six categories were chosen for their interest to museum professionals, especially the two examples of the final comparison between two very different virtual museums, to prove that even a 3D passive movie inside a virtual theatre and a collaborative web city museum can exist in the same container-taxonomy-meta-model.

Therefore my taxonomy aims to be an instrument for museum professionals to understand what a virtual museum is, but also an operational tool that allows them, having focused on the communicative needs of the museum, to design hypothetical technological interventions providing practical solutions capable of meeting the needs of the museum itself.

As has been suggested by the peer review, further studies are needed, and will be undertaken in proving the validity of the theory in 2 years' time; also for considering experiments in emerging technology such as 'blended' technology, augmented reality and Google Glass experiences.

Because of this, in the future it may need further studies and continuous adjustments, and will be developed in further presentations at museum professionals meetings. In the words of Christiane Paule,

> *New media art is a continuously evolving field and the development of possible taxonomies for the art form has been a much discussed topic and an elusive goal. The fact that new media art successfully evades definitions is one of its greatest assets and attractions, but at times the art seems more alive than its practitioners want it to be.* (Paul, 2007, 4)

My suggestion of taxonomy and definition of virtual museum is not a mantra, but rather a point of departure for further discussions and debate.

This extensive research has furnished me with a new awareness of the phenomenon of virtual museums but above all with an awareness of the need for dialogue between museum professionals and IT specialists involved in the creation of technological applications in the field of heritage. This work has particularly allowed me to explore the concept of exhibition space, in its virtual nature, and from there virtual exhibition space itself. This space becomes a place of interaction, in the same way as a room with pictures hanging on display is not enough to make a museum, a website with images of the works from a museum is not enough to create a virtual museum. Exhibition space must be place of interaction (Ciolfi, 2004: 7), the place where virtual visitors encounter artworks, in a museum and not in a simple website, or a 3D reconstruction, or a physical place with touch screens. I hope with this work to raise awareness not only, as I have shown above, among museum professionals designing virtual museums, but also among IT professionals in the key concepts of museology which must be at the basis of all projects related to the communication of heritage.

Several other issues emerged during this research, not only from the new point of view adopted, but especially from the contribution made by the peer-review to the first version of my taxonomy. Museums with a presence only on technological platforms, as is the case of the Museum Torino mentioned in this work, can be seen as a new category of museums that Lucia Cataldo has suggested be known as 'complex museum identities', that I have described in this work. I strongly hope that museology takes into account the emergence of these new museums, that, together with my definition of virtual museums set out in this work, should be similar in all respects to traditional museums. In my future work I intend to examine in closer detail, these 'complex museum identities' that meet the first part of my definition, in line with the

museological standards identified by ICOM for virtual museums.

What does it mean, for example, to write up statutes for virtual museums? What does it mean to draw up regulations for their operation? I intend to analyze this issue in further studies, in order to provide real-world examples, from experiences in virtual museums. In Chapter 4 of this work I have limited myself to analyzing how museum professions have changed in the light of the application of new technologies. In fact, I already tried to work with this issue.

Two other very important parts of my thesis are practical suggestions to the AVICOM museum staff involved in the communication of heritage, with a discussion of the European Charter of museum professionals, to contribute, as I am doing in the appropriate discussion board in ICOM, to a more precise definition of the roles and the professional profiles for museum staff in marketing and IT services, both for museum directors and other museum professions.

These findings, as well as the fourth Chapter, would then open up a series of discussions that would originate new work on my part, and I hope to make new contributions on this question.

Appendix A – Peer-reviews

ENGLISH	ITALIAN
NANCY PROCTOR Co-chair, Museums and the Web Dear Simona, I'm very sorry to let you down on this. Having looked over what you sent me briefly, I fear I shall have to admit that I just don't have the time to read through all your materials and think deeply enough about the problem to give you valuable feedback. I would really have to do some research of my own as well, I think, and although the question of the definition of the virtual museum is very interesting to me, it is not something I can dedicate time to right now given everything else that is on my plate. I'm sorry the timing was bad for me this time! I hope to be in a better place to give you feedback later in your research! With best regards and best wishes, Nancy.	
IRENE RUBINO As you rightly pointed out, with the evolution of technology it is no longer appropriate to think of the virtual museum as an exclusively online museum, and I agree that a new definition could start from this general definition of the museum and its standards. I believe in fact that, given the variety of experiences you've described (the "6 types"), it is appropriate to set a dividing line to distinguish "virtual museums" from those communication activities carried out using digital means	IRENE RUBINO Come hai giustamente sottolineato, con l'evolvere delle tecnologie non è più appropriato pensare al virtual museum come a un museo esclusivamente on-line, e concordo sul fatto che una sua nuova definizione possa partire da quella generale di museo e dai suoi standard. Credo effettivamente che, data la pluralità di esperienze da te descritte (i "6 tipi"), sia opportuno fissare un discrimine per distinguere i "musei virtuali" da quelle attività di comunicazione effettuate attraverso mezzi digitali dai

by museum-institutions or even by organizations / individuals / companies with a relationship to different aspects of cultural heritage. If we start from ICOM'S definition, I would ask myself what role is to be played by the "permanent institution" component within the definition of a virtual museum; since most museums are now expanding their digital and online activities. I would also ask myself whether this "digital articulation" of the mission of museums on the web and other technologies requires its own definition or whether it is the very definition of "museum" itself that must somehow take into account new modes of conservation, research, communication and exhibition of heritage. On re-reading the documents on your categories, I asked myself about the role played by the creators of virtual museums (es.utente): how can "virtual museums" created mixing digital materials be classified? What about the 'virtual museum created by a "subject recognized for his or her reputation" or even the digital collection made by a single user? Perhaps you're already considering this issue already in definitions 5th and 6th. What characterizes the word "museum"? Who can create a virtual museum? In principle, I asked myself about the definition of the virtual museum in the age of participation and crowdsourcing, but as I said, maybe these points have already been included in points 5th and 6th.	musei-istituzioni oppure anche da enti/soggetti/società che hanno a che fare con vari aspetti del patrimonio culturale. Se si parte dalla definizione ICOM, mi chiedo che ruolo debba avere la componente di "permanent institution" all'interno della definizione di museo virtuale; inoltre, dal momento che sempre più musei stanno espandendo le proprie attività digitali (es.on-line), mi chiedo anche se questa "articolazione digitale" della mission dei musei attraverso il web e altre tecnologie necessiti di una sua propria definizione o se sia la definizione stessa di "museo" che debba in qualche modo tenere in considerazione i nuovi modi di conservazione, ricerca, comunicazione ed esposizione del patrimonio. Leggendo nuovamente i documenti sulle categorie, mi interrogavo a proposito del ruolo giocato da chi realizza il museo virtuale (es.utente): come classificare il "museo virtuale" creato da un utente mischiando materiali digitali? E' museo virtuale quello creato da un "soggetto riconosciuto per la sua fama" o anche la collezione digitale realizzata da un utente/un singolo? Forse però prendi in considerazione questa questione già nelle definizioni quinta e sesta. Cosa caratterizza la parola "museo"? Chi può creare un museo virtuale? In linea di massima, mi interrogherei sulla definizione di museo virtuale ai tempi della partecipazione e del crowdsourcing: ma come ti dicevo, forse questi punti sono già inclusi nelle definizioni quinta e sesta.
MARIA CHIARA LIGUORI AND ANTONELLA GUIDAZZOLI Hello, We've read through your material and we'd like to let you know about the excellent work done by the project V-Must on the categorizations of virtual	MARIA CHIARA LIGUORI AND ANTONELLA GUIDAZZOLI Ciao, abbiamo letto un po' il tuo materiale e, oltre a segnalarti l'ottimo lavoro svolto dal progetto V-Must sulle categorizzazioni dei musei virtuali

museums (you can find it here): http://www.v-must.net/library/documents/d21-terminology-definitions-and-types-virtual-museums), We have some reflections for you. We understand that the main starting point of your categorization is the type of interaction between the collection and visitors. As far as you wrote, you could probably add the category of what we would call “the multiplied museum” taking a cue from the CINECA VisitLab. In this case the interaction is between collection and visitor (bidirectional) and between collection and collection (interaction between museums) stimulating further interactions. We have attached a paper where we have started to present a broad idea of reutilisation (interaction between museums, between museums and visitors and with the material produced by the visitors returning to the museum circuit of production). The article is about to be published. The text is strongly linked to the project dedicated to the promotion of the UNESCO candidacy of the arcades of Bologna. For feedback on Apa you can refer to the attached paper, in which we have referred to Tripadvisor, unfortunately, we have been unable to provide any other type of feedback. Obviously the data have changed but remain quite consistent, with approximately 26% of reviews mentioning Apa directly and in positive terms. See you soon, Maria Clara and Antonella	(che puoi trovare qui: http://www.v-must.net/library/documents/d21-terminology-definitions-and-types-virtual-museums), abbiamo fatto alcune riflessioni. Ci sembra di capire che la tua categorizzazione parta principalmente dal tipo di interazione tra collezione e visitatore. A quanto da te scritto, si potrebbe forse aggiungere la categoria che noi chiameremmo di "museo moltiplicato", che prende spunto da quanto portato avanti da tempo presso il VisitLab Cineca. In questo caso l’interazione è tra collezione e visitatore (bidirezionale) e tra collezione e collezione (interazione tra musei) che avvia ulteriori interazioni. Ti alleghiamo un paper dove abbiamo iniziato a presentare l’idea ampia di riuso (interazione tra musei, tra musei e visitatori e con materiale prodotto dai visitatori che torna nel circuito della produzione museale). L’articolo è in fase di pubblicazione. Al discorso si ricollega anche molto il progetto dedicato alla promozione della candidatura unesco dei portici di bologna. Per il feedback su Apa puoi vedere sempre nel paper in allegato che abbiamo fatto riferimento a Tripadvisor, non avendo a disposizione purtroppo altro tipo di feedback. Adesso i dati sono ovviamente cambiati ma rimangono abbastanza in linea, con un circa 26% di recensioni che citano apa direttamente ed in termini positivi. a presto, Maria Chiara ed Antonella
LUCA MARCHIONNI I read the book and the thesis in English. Obviously they are not able to provide a real view of your expertise in the field. I	LUCA MARCHIONNI mi sono letto il libro e la tesi in inglese. Ovviamente non sono in grado di darti una vera mano vista la tua expertise nel

can say however that I identify completely with the taxonomy, especially with the fact that it does not have a chronological basis. On studying the examples of virtual museums that you mentioned I saw the "Museum of the Mind Lab" has a problem on its home page and this makes access more difficult. One example of a virtual museum I find to be complete is the Museo Galileo (but I imagine that you already know all about this well enough).	settore... posso dirti però che mi ritrovo assolutamente all'interno della tassonomia e che trovo vincente il fatto che non sia su base cronologica. Nell'andare a studiarmi gli esempi di Musei virtuali citati ho visto che "Museo Laboratorio della Mente" ha un problema nella Homepage e questo rende l'accesso più complicato. Mentre un Museo virtuale che prendo sempre ad esempio perchè trovo piuttosto completo è quello del Museo Galileo (ma credo che tu lo conosca già bene).
RAPHAEL MEYER ABOAV I have read the dossier and to me it seems that your taxonomy can hold together. I cannot think of any more paradigms of interaction between public and digital collections. Congratulations: you have done a great job in framing an overview that deserves a second stage, focussing on the following research question: How can museum organisations be reorganised in order to offer the latest generation of interactions structurally? I attach a document from the UK setting out a concept I hold very dearly: the museum as a catalyst for change that makes difference for individuals, communities and society	RAPHAEL MEYER ABOAV Ho letto il dossier e a me pare che la tua tassonomia possa reggere. Non ho in mente ulteriori paradigmi di interazione tra pubblico e collezioni digitali. Complimenti hai fatto un lavorone di inquadramento che meriterebbe un secondo step focalizzato sulla seguenbte research question: come bisogna riorganizzare le organizzazioni museali per metterle in condizione di offrire strutturalmente interazioni di ultima generazione? Ti allego un documento UK che riprende un concetto anche a me molto caro: the museum as a catalyst for change that makes difference for individuals, communities and society
CHIARA KOLLETZEK Nevertheless I have read the documents, and it seems to me that the categories you have identified are complete and work: especially the case which I have applied in my own work, represented by category 2nd, containing two specific hypotheses: the virtual gallery in which the digitally reproduced objects have been conceived as "pathways" designed from the outset to be enjoyed online, and cases in which the virtual gallery would like to replicate the "real" collections in the museum. In	CHIARA KOLLETZEK Ho comunque letto i documenti, e mi sembra che le categorie da te individuate funzionino e siano complete: in particolare, il caso a cui ho dato applicazione nel mio lavoro è rappresentato dalla categoria "2", in cui nello specifico si verificano 2 ipotesi: galleria virtuale in cui gli oggetti riprodotti digitalmente vengono fatti afferire a un "percorso" guidato concepito e studiato ab origine per essere fruito online, e casi in cui la galleria

fact, in my opinion, these two hypotheses are quite different but are often trivialized as being similar according to a single common denominator of “virtual consumption”! Hoping that my comments do not seem too trivial, let me know what you think.	virtuale vorrebbe replicare quella “reale” fruibile in museo. In realtà si tratta di due ipotesi molto diverse a mio parere, ma che spesso vengono banalizzate come simili e appiattite secondo un unico comun denominatore che è la “fruizione virtuale”! Sperando che le mie considerazioni non ti sembrino troppo banali, fammi sapere che ne pensi.
ALESSANDRO CALIFANO I think that overall, the six categories work, I do not think it necessary to diversify further. The second version of the chapter seems to me to better articulated however. Finally, as regards your third question, given the Jurassic era in which I find myself working, I’m afraid that the question is not relevant ... However, if you had never advanced in this direction, there is no doubt that some future historical archive which is at the core of my service, would belong to the fourth category (with some elements from the first). I hope that as a starting point for reflection, you will find the points I have listed useful.	ALESSANDRO CALIFANO Mi pare che nel complesso le sei categorie funzionino, né mi pare necessario diversificare ulteriormente. La seconda versione del capitolo mi pare comunque meglio articolata. Per quanto riguarda infine la tua terza domanda, stante l’era giurassica nella quale mi trovo ad operare, temo che la domanda non sia pertinente... Tuttavia, ove mai si facessero progressi in tale direzione, non c’è dubbio che un archivio storico futurista qual è quello che costituisce il fulcro del mio Servizio dovrebbe appartenere di diritto alla quarta categoria (con qualche elemento della prima). Spero che come spunto di riflessione i punti che ho elencato possano esserti utili.
GIULIANA PASCUCCI I’m reading the text carefully and I’m also using it for some seminars at the course of museology at the Academy of Fine Arts of Macerata. Your analysis is precise and detailed and I do not think I can add too much. Creating taxonomy is always highly difficult and subjective although it may aim to be all-inclusive. However I am curious as to why you chose the definition virtual and not multimedia museum?	GIULIANA PASCUCCI Sto leggendo attentamente il testo e lo sto utilizzando anche per alcune lezioni seminariali al corso di museologia dell’Accademia di Belle arti di Macerata. La tua analisi è precisa e dettagliata non credo di poter aggiungere molto. Creare una tassonomia è sempre cosa molto ardua e soggettiva nonostante ci si proponga di essere omnicomprensivi. L’unica curiosità è perché scegli la definizione musei virtuali e non multimediali?

ELISA MANDELLI 1) Do you believe the 6 categories "work"? If I have understood correctly, your definition of a virtual museum includes not only museums but "physical" also online museums such as those of *Studio Azzurro*. Instead I would tend to define them as "multimedia museums" or "audiovisual museums", setting up a very different system with respect to the various forms of museums on the web. I am somewhat perplexed about the inclusion of this type in your classification. Having said this, your argument is perfectly consistent, and it cannot be said that this group cannot constitute a sub-category of virtual museums. 2) Would a new category be needed? I do not think so. 3) Do you find the categorization valid with regard to your duties in your work or in your museum? From the benefits the museums on the web it would seem to works. As a scholar of multimedia museums (*Studio Azzurro* etc.) I would repeat that this category has some important differences with respect to online visits (the presence of the body of the visitor, for example, is no small thing ..), and maybe this should be pointed out.	ELISA MANDELLI 1) secondo voi le 6 categorie "funzionano"? Se ho ben capito, la tua definizione di museo virtuale comprende non solo musei online ma anche musei "fisici" come quelli di *Studio Azzurro*. Da parte mia tenderei invece a definirli piuttosto come "musei multimediali" o "musei audiovisivi", che mettono in campo un dispositivo molto diverso rispetto alle varie forme di musei sul web. La mia perplessità è dunque a monte sull'inclusione di questa tipologia nella classificazione. Detto questo, tua argomentazione è perfettamente coerente, e non è detto che questo raggruppamento non possa costituire una sotto-categoria dei musei virtuali. 2) Sarebbe necessaria una nuova categoria? A mio avviso no 3) Rispetto ai vostri compiti nei vostri musei o nel vostro lavoro, ritrovate la validità di questa categorizzazione? Da fruitrice dei musei sul web mi sembra funzioni. Da studiosa dei musei multimediali (*Studio Azzurro* ecc.) ribadisco che forse questa categoria presenta alcune differenze importanti rispetto alla fruizione online (la presenza del corpo del visitatore, per esempio, non è cosa da niente..), che magari andrebbero segnalate.
PAOLO PAOLINI - MICHELA NEGRINI In a nutshell, in our view, the following would seem to be missing: – "Immersive virtual experience" such as Sara Kenderdine's interactive and immersive experiences for museums and galleries; – "Blended experiences" such as	PAOLO PAOLINI - MICHELA NEGRINI In estrema sintesi, a nostro avviso, sembrerebbero mancare: – "immersive virtual experience": come ad esempio le interactive and immersive experiences for museums and galleries di Sara Kenderdine; – "blended experiences": come ad

the use of mobile devices or Google Glass, in which the virtual and real museum contaminate one another; – Interactive browsing: today, “interactive browsing (mechanical)” is limited to technological museums (such as the Exploratorium); the rest is digitalized. The difference between mechanical and digital is clear, therefore. An example for reflection is the ’exhibition “The Etruscans and the Mediterranean. The city of Cerveteri” in Rome until July at the Palazzo delle Esposizioni. Here 3D reconstructions (3D video with the Cerveteri tombs allow a gesture-based interaction. In your opinion, is this free browsing or interactive browsing? Perhaps it would be better to separate into different axes the mechanisms of interaction of the nature of the contents, of elements such as free and guided exploration and study each combination separately. We hope that this feedback will be useful for the conclusion of your work, we greet you cordially.	esempio l’utilizzo di devices mobili o google glasses, in cui museo virtuale e museo reale si contaminano l’un l’altro; – interactive browsing: oggi, l’“interactive browsing (mechanical)” è limitato ai musei tecnologici (ad esempio l’Exploratorium); per il resto è digitalizzato. Non è chiara dunque la differenza tra mechanical e digital; Un esempio per una riflessione è l’ esposizione “Gli Etruschi e il Mediterraneo. La città di Cerveteri”, a Roma fino a luglio, Palazzo delle Esposizioni. Qui ricostruzioni 3D (video 3D con tombe di Cerveteri) permettono una gesture based interaction. A tuo avviso, si tratta di free browsing o interactive browsing? Forse sarebbe meglio separare su assi diversi i meccanismi di interazione dalla natura dei contenuti, da elementi come esplorazione libera e guidata e studiare separatamente ogni combinazione. Augurandoci che questo feedback possa essere di utilità per la conclusione del tuo lavoro, ti salutiamo cordialmente.
SOFIA PESCARIN I really like the way you’ve made reference to technology and the real-virtual relationship! 1) Do you believe the 6 categories “work”? Before answering, I have a question, as you see it, should a virtual museum be part of only one of the six types? For example, is the Museum of Iraq (which you have classified as 1st type) only 1st type ? 2) Is a new category needed? We had a brainstorming sessions and came up with the following: reality is not categorized	SOFIA PESCARIN Mi piace molto la tabella che hai messo con il riferimento alla tecnologia e al rapporto real-virtual! 1) secondo voi le 6 categorie “funzionano”? una domanda prima di rispondere: per come la vedi tu, un museo virtuale dovrebbe rientrare in una solo dei sei tipi? ad esempio il museo dell’Iraq (che vedo tu l’hai classificato come tipo 1) è solo tipo 1? 2) Sarebbe necessaria una nuova categoria? abbiamo avuto un giro di discussioni e questo è il riassunto:

categorization is always a function of something if it is defined in function of WHAT YOU WANT to categorize, the work will be clearer, for example: **by type of experience / scope** 1 Free browsing (within a closed environment) (interaction in this case as below) 2 Guided browsing within a potential learning environment (this would remove potential learning ... is learning only guided? From categories 1 and 2 it seems that only allow guided learning is considered as learning) **by interaction** 1.2 Interactive browsing (gesture-based interaction). 1.3 Interactive browsing (device-based interaction). **by cognitive scope** 5 Constructivist, where users create experiments with virtual objects. 6 Experimental. The objects created experiments; the museum is a structure that creates experiments with visitors. The museum itself is an experiment.	la realtà non è categorizzata la categorizzazione è sempre in funzione di qualcosa se definisci in funzione di COSA VUOI CATEGORIZZARE, il lavoro risulterà più chairo, ad esempio: **by type of experience / scope** 1 Free browsing (within a closed environment) (interaction in questo caso andrebbe qui sotto) 2 Guided browsing within a potential learning environment (toglierei potential learning... learning è solo guidato? dalle categorie 1 e 2 sembra che solo il guided consenta apprendimento) **by interaction** 1.2 Interactive browsing (gesture-based interaction). 1.3 Interactive browsing (device-based interaction). **by cognitive scope** 5 Constructivist, where users create experiments with virtual objects. 6 Experimental. The objects create experiments; the museum is a structure that creates experiments with visitors. The museum itself is an experiment.
NICOLETTA DI BLAS Hello Simona, I see that Paolo and Michaela have replied from Lugano. My feedback is somewhat diverse. My impression (confirmed by the description) is that your categories are heterogeneous in nature: e.g. the educational dimension emerges only in the 5th, but has not been touched upon beforehand ... the first appear to be governed by interactive potential ... my advice is to proceed in this way: specify all the DIMENSIONS (you mentioned all of them in the chapter) you consider relevant to define a virtual museum (e.g. INTERACTION: FREE/CLOSED; SPACE: free/forced etc.) and then create a table in which you select which values a “TYPE” of virtual museum t you’ve	NICOLETTA DI BLAS Ciao Simona, ho visto che Paolo e Michela ti hanno risposto da Lugano. Il mio feedback è di natura un po’ diversa. L’impressione (confermata dalla descrizione) che si ha delle tue categorie e’ che siano di natura eterogenea: ad es. la dimensione didattica emerge solo nella 5°, ma non è toccata nelle precedenti… le prime sembrano governate dalle possibilità interattive… il mio consiglio è di procdere così: individua tutte le DIMENSIONI (le hai, sono tutte menzioante nel capitolo) che giudichi rilevanti per definire un museo virtuale (es.: INTERAZIONE: LIBERA/CHIUSA; SPAZIO: libero/costretto etc.). Poi crei una tabella in cui selezioni quali

identified does / does not have. At that point, NAME each type (which could be the same identified by Paolini, if you want to make use of them): they can be current names or new names for greater homogeneity' and/or are more 'easily memorised. To sum up, I'm not suggesting you change the categories but rather that you explain and present them in a different way. I think this would be an improvement. Do you understand? If not we can talk on the phone later on.	valori una "TIPOLOGIA" di museo virtuale che hai individuato ha/non ha. A quel punto dai un NOME ad ogni tipologia (che poi sono le tue più quelle che Paolini segnala, se vuoi accoglierle): possono essere i nomi correnti o dei nomi nuovi che veicolino maggiore omogeneità e/o siano più facilmente memorizzabili. In sintesi, non ti suggerisco di modificare le cateogorie ma di spiegarle e presentarle in modo diverso. Credo sia meglio anche in vista di una loro "fortuna". Si capisce? Se no possiamo sentirci al telefono più tardi. Spero di esserti stata utile.
MATTEO BELLINI Here are my replies 1) the categories work as a description of the current scenario 2) no, not right now 3) Unfortunately, I cannot provide a reply	MATTEO BELLINI Ti invio le mie risposte: 1) le categorie funzionano a descrivere l'attuale scenario 2) no, attualmente no 3) non posso purtroppo fornire risposta
LUIGI MARIA DI CORATO 1) Do you believe the 6 categories "work"? they do work for me, even though museums are changing and mobile technology transforming our relationship with the museum, "normalizing" the relationship between the museum and ICT and the opening the issue of "cultural landscapes" thanks to geotagging, giving the opportunity for our museums to "restore" objects to their original contexts and vice versa. 2) Would a new category be needed? I think it is useful to make an explicit reference to wearable technologies such as Google glass, that in six months will have become so pervasive and affordable. I believe this will be a revolution for museums, as can be seen in the experiments that we are starting at San	LUIGI MARIA DI CORATO 1) Secondo voi le 6 categorie "funzionano"? Secondo me funzionano, anche se forse i musei stanno cambiando e la tecnologia mobile sta davvero cambiando il nostro rapporto con il museo, "normalizzando" il rapporto tra museo e ICT e aprendo il tema dei "paesaggi culturali" ovvero, grazie alla georeferenziazione, dando la possibilità ai nostri musei di "riportare" gli oggetti ai contesti di provenienza e vice-versa. 2) Sarebbe necessaria una nuova categoria? Credo che sia utile fare un esplicito riferimento alle tecnologie indossabili con i glass, che tra sei mesi cominceranno ad essere abbordabili e quindi pervasive. Credo che saranno una rivoluzione per il museo, come dimostra la sperimentazione che stiamo avviando a

Gimigano 3) Do you find the categorization valid with regard to your duties in your work or in your museum? In everyday museum work, the series cannot be said to have a decisive impact. The categories have the merit of helping us to reflect on the use of the technologist and the results to be obtained with respect to the sharing of content.	San Gimigano . 3) Rispetto ai vostri compiti nei vostri musei o nel vostro lavoro, ritrovate la validità di questa categorizzazione? Nel lavoro quotidiano, all'interno di un museo, la casistica non ha un impatto davvero determinante. Le categorie hanno il merito di averci aiutato a riflettere sull'uso della tecnologa e sui risultati che si vogliono ottenere rispetto alla condivisione dei contenuti.
LUCIA CATALDO As for Dr. Caraceni's taxonomy, I would suggest a division based on the needs of museums to the extent that this allows flexibility covering changing needs and technological development. I would suggest the inclusion of a new category, that is to say the "museum / complex virtual identity," such as *MuseoTorino*, which is configured as an element with a strong identity character, NOT NECESSARILY a container (though virtual) of objects, but wishing to appear as a single identity such as a complex landscape or a city. This new type of museum is in fact necessary to emphasize that the connotation of identity can only occur with the virtual mode, while in the physical world this would be much more difficult and with weaker results.	LUCIA CATALDO In merito alla tassonomia della dott.ssa Caraceni suggerisco una suddivisione basata sui bisogni dei musei in quanto consente una elasticità di cambiamento al variare dei bisogni stessi e dello sviluppo delle tecnologie. Suggerisco di includere una nuova categoria, che è quella del "Museo/identità complessa virtuale", come *MuseoTorino*, che si configura come elemento dal carattere appunto fortemete identitario, NON NECESSARIAMENTE contenitore (benchè virtuale) di oggetti, ma che vuole far apparire come unica identità ad esempio un paesaggio complesso o una città. Per questa nuova tipologia di museo è infatti necessario sottolineare che la connotazione di identitàpuò avvenire solo con la modalità virtuale, mentre nel mondo fisico sarebbe molto più difficile e con un risultato meno forte.

Appendix B – Taxonomy 1.0

3.1 Six generations of virtual museums

In my research into the taxonomy of virtual museums, I have been able to identify six different generations (Caraceni, 2008).

1. Free browsing within a closed environment.
2. Guided browsing within a potential learning environment.
3. Interactive browsing (mechanical).
4. Interactive browsing (digital).
5. Constructivist, where users create experiments with virtual objects.
6. The objects create experiments; the museum is a structure that creates experiments. The museum itself is an experiment.

Four years ago my aim was to place these categories in a historical pattern in an attempt to order the phenomena of virtual museums all over the world chronologically. I have now observed that all of these categories, including the less advanced, have been or are presently in use in recent projects; therefore I have decided to abandon the chronological timeline for a taxonomy of virtual museums that includes contemporary, recent and older projects in the same category.

> *Virtual museums on the Internet have been 'under construction' for some ten years now. This is a short time compared to the long tradition of 'brick and mortar' museums. Hence the virtual museum still lacks a generally accepted definition (for*

a working definition see the central quotation) and even an established term to designate it. It is known as on-line museum, electronic museum, hypermuseum, digital museum, cybermuseum or a Web museum depending on the backgrounds of the practitioners and researchers working in the field. Regardless of the name, the idea behind this phenomenon is to build a digital extension of the museum on the Internet, a museum without walls. Enthusiasts even think of establishing a world-wide virtual museum that might bring together digital objects from museum collections all over the world. The following categories of museum, developing into the virtual museum, can be identified on the Internet:

• The brochure museum: this is a web site which contains the basic information about the museum, such as types of collection, contact details, etc. Its goal is to inform potential visitors about the museum.

• The content museum: this is a website which presents the museum's collections and invites the virtual visitor to explore them online. The content is presented in an object-oriented way and is basically identical with the collection database. It is more useful for experts than for laymen because the content is not didactically enhanced. The goal of this type of museum is to provide a detailed portrayal of the collections of the museum.

• The learning museum: this is a web site which offers different points of access to its virtual visitors, according to their age, background and knowledge. The information is presented in a context-oriented way instead of being object-oriented. Moreover, the site is didactically enhanced and linked to additional information that motivates the virtual visitor to learn more about a subject they are interested in and to revisit the site. The goal of the learning museum is to make the virtual visitor come back and establish a personal relationship with the online-collection. Ideally, the virtual visitor will come to the museum to see the real objects.

• The virtual museum: the next step on from the learning museum is to provide not only information about the institution's collection but to link to digital collections of others. In this way, digital collections are created which have no counterparts in the real world. This is the implementation of André Malraux's vision of the 'museum without walls'.(Schweibenz, 2004, p. 1)

This taxonomy, even if comes from an official ICOM document (ICOM Newsletter in 2004) does not satisfy me for two reasons. In 9 years there have been different types of experiments and certain examples of virtual museum simply cannot be placed into these three categories.

I could go further into the taxonomy of virtual museums, but now I would like to mention the V-Must Network, the network of excellence for virtual museums[105].

[105] http://www.v-must.net

In this project, an attempt has been made to categorize virtual museums[106], using the following categories:

- Content
  - Archaeology Virtual Museum
  - Art Virtual Museum
  - Ethnographic Virtual Museum
  - Historical Virtual Museum
  - Natural History Virtual Museum
  - Technology Virtual Museum
- Interaction technology
  - Interactive Museums
  - Device-based interaction
  - Desktop device interaction
  - Tangible interaction
  - Natural interaction system
  - Gesture-based interaction
  - Speech-based interaction
  - Not-Interactive Virtual Museums.
- Duration

[106] http://www.v-must.net/virtual-museums/categories

    - ... (missing)

- Communication
    - ... (missing)
- Level of Immersion
    - ... (missing)
- Format
    - ... (missing)
- Scope
    - ... (missing)
- Sustainability
    - ... (missing)

As you can see, this is still a work in progress, one reason why I will make no reference to it. However, if you take a look at the virtual museums mentioned in their website[107], they tend to be limited to 'older' (to my way of thinking) examples: the majority are only 3D reconstructions. I would like to refer to a wider scene, because I believe that a website can also be considered a virtual museum too, as I will explain further on.

I aim to provide an example of each category with case studies in the following paragraphs.

[107] http://www.v-must.net/virtual-museums/all

3.2 First generation virtual museums – case studies

1st generation

This generation of virtual museums has its origin in the same museological model as early museums, that is to say, as a collection owned by the powerful, to be browsed by walking through a gallery, looking at exhibits. In the earlier versions there was no possibility for commenting upon the exhibits. In later versions, including web 2.0, the possibility of adding comments was available but not stressed at all. This model could be said to be based on the library, to be browsed in users' spare time, with a strong contemplative aspect. In the context of tangible museums, one example could be the Galleria degli Uffizi in Florence. Examples of this type of VM include the Virtual Museum of Iraq, the Italian website 'Museo delle Lavatrici Giocattolo', certain Museums in Second Life (Second Louvre, the International Space Flight Museum (all these galleries are 3D reproductions of real galleries, that allow avatars to walk through corridors and glance at framed JPGs), and Google Art Project.

I have dealt with the 3D reconstruction of spaces in the previous chapters, and as I stated, I do not see them as virtual museums at all, but rather as important experiments in the investigation of the sense of 'space' and 'virtual space' in non-tangible museums. By presenting a case study of the 1st generation of virtual museums I would like to discuss the Google Art Project here, remitting the patient reader to the 6th generation of virtual museums, for other, different cases of museums in Second Life.

3.2.1 2nd case study: Google Art Project

> The first phase of this project was launched in February 2011, involving the largest museums in the world and allowing the largest galleries in the 17 participating museums to be toured in the same way as in Google's Street View. Another feature

is that for each museum, an artwork is presented in 'gigapixel' format: each of the museums participating in the initiative has chosen an artwork that has then been photographed using high resolution technology. Each of these images is composed of about 7 billion pixels, a resolution which allows details not otherwise visible to the human eye, such as tiny particles and brush strokes of colour, to be clearly seen.

From the Art Project – 1st phase screen you can see the location of the artwork within the museum by browsing the menu on the right, with additional information on the author taken from Google, (not much, admittedly, apart from the connection with Google Scholar on scientific papers on the artists, that can be viewed from the guide with a hyperlink to the authors, or explanatory videos taken from YouTube, which is also owned by Google), or historical or general information on the museum itself. Other artworks in the museum can also be viewed in high-definition, however they are not as impressive as the Gigapixel images (of which I repeat, there is just one for every museum participating in the initiative).What else can be done? Not much, although sufficient. Criticism has been made, especially by the foreign press, of the browsing bugs and also of obvious mistakes in photographing the artworks in the galleries and the annoying reflections of light on the artworks, that it at times seems hard to believe that they were not placed there deliberately. However, the comments I have been following in various web communities have all been positive, relating to the possibility of being able to get an idea of the museum, of taking a walk around its digital galleries, of being able to view a maximum amount of information but enough to be able to plan a future visit.

It should be said that Google has provided museums with an agile tool for sketching out 'virtual museums' from Mountain View. An illustrious precedent was an

initiative at the Prado Museum, on line from 11th January 2009 using the Google Earth system, with various artworks available in Gigapixel mode, and for this reason not included in the Google Art Project.

What I like about Google's Art Project – 1st phase is that the whole system is centred on the museum, and not on individual artworks, that 'happen' to be located in a given museum. It should not be forgotten that for those persons searching for art on the Internet there are several search tools, first of all, the lord of search engines, Google; so dear to the young and not so young to for researching art on the Web, Google Images, and databases; however none of these instruments had focused on digital museums up to now.

What seems to me to be a drawback to this project is that the virtual museums that exist in the Google Art Project - 1st phase are all cut from the same cloth, looking a lot like a series of digital interactive guides to world museums and we end up finding ourselves in something not unlike a 'digital museum supermarket' with many different contents, all with the same packaging, containing different artworks, all of them on offer, all in the same way. It would seem that the museums involved in the experiment are aware of this risk, and have no illusions about it. To quote Cristina Acidini, superintendent of the State Museums of Florence, on the presence of the Uffizi Gallery in Google Art Project:

TheUffizi Gallery, the oldest museum in modern Europe established in the heart of Florence to house the art collections of the Medici, the chief patrons of the Renaissance, now enters the realm of Google product opening up to access on a planetary scale. In the course of the virtual tour through the gallery, including over seventy masterpieces works ranging from Cimabue to Goya, users will come across the symbolic image of The Birth of Venus by Sandro Botticelli, a sublime ideal of culture and beauty, epitome of the flowering of Florence at the time of Lorenzo the Magnificent.

To sum up, being part of the Google product, given the visibility received, can be an

attractive bargain.

I also expected from this 1st phase of the project greater interactivity between visitors: however it is only possible to share the link to the view you are enjoying at that moment on Facebook, Twitter, Buzz (the Google community) and by mail, and therefore there cannot be said to be any 'social' approach in the project. But we are talking about a project, do not get me wrong, where I appreciate particularly the centrality of the fact that museum has been recognized as the interpretative 'basis' for the enjoyment of the artworks it contains and I look forward to seeing the future developments of this embryonic but promising project.

In recent months Google Art Project changed to a second phase of the project, being less focused on museums and more on the collections and artworks. Personally, I see this as deterioration. Now the museum has disappeared completely from the screen, becoming only the 'title' of the collection to be browsed and only to be seen in the Google Street View journey. There is no possibility of sharing any more than before except for Google Hangout, and Twitter-Facebook-Google+ and email, but a tool does exist to create 'My (own) Gallery' and to browse other people's galleries too.

3.3 2nd generation virtual museums – case studies

2nd generation

In this model of virtual museum, browsing is guided in such a way that it may also be considered a learning environment; however the way the technology works means that users have no possibility of escaping from the pattern. In the field of real museums, this model would be represented by the introduction to all guided tours. But for examples of real museums with this strong component, I would perhaps refer to certain house-museums or residences of artists; they can only be visited with a guide, and there is no

way of skipping the set visit pattern in order to make a personalized tour. This model is also the model to be found in old audioguides, where visitors would don headphones, again with no possibility of skipping the pattern of the audio content.

Concerning audioguides it is interesting to note their principal purpose that is to add paratextual information to the objects on display.

> *Here the interest has moved from the displayed object itself, or maybe its reproduction, to the information and communication around it, in other words, to museum paratexts. The concept of paratexts is based on Gérard Genette's narratological and textual typological survey published in 1987 in the book Seuils (translated as Paratexts. Thresholds of Interpretation, 1997), but their roots go further back in the history of semiotics to Roland Barthes' anchorage concept (Barthes, 1964). All these narratological devices add something to the meaning of a text, and they can be defined and described briefly like this:*
>
> - *Anchorage: a verbal text that anchors and controls the reading of an image is called an anchoring text. It is placed in close proximity to the image. It is practically impossible to find an image without an anchoring text. The reason is that images are polysemic, i.e., they contain so many codes that a sender must necessarily lead the reader's perception of the image in the intended direction with the help of the anchoring text.*
> - *Paratexts are texts that are placed around the main text and which add extra meaning to it. The main text is called the hypotext. There are different types of paratexts each with its own designation:*
> - *Peritexts are paratexts that are physically connected to the hypotext without being an integral part of it. This is for instance a book's title printed on its cover.*
> - *Epitexts are paratexts removed from the hypotext. This is for instance a review of a book in a newspaper.*
> - *Autographic paratexts are produced by the producers of the hypotext themselves. For instance, a director's spoken commentary of a film on a DVD.*
> - *Allographic paratexts have been made by someone other than the producer of the hypotext. For instance a review in a magazine of a film.* (Christensen, 2010, p, 17)

I would like to mention here what I've written above about the museum 'pinball machine' described by McLuhan, recalling the idea of the museum without labels. By pressing a button in a technological device it is possible to access any information required by the visitor; more recently this has become possible through the use of QR

codes that permit a personal cell phone connected to the network to access information. The use of QR codes has been criticized by important museum curators such as Nina Simon, and Nancy Proctor:

> *I've been sceptical of their impact on museums. They're only accessible to the minority of visitors who attend with smartphones, and they're only used by the small percentage of those visitors who know how to download apps and are motivated to access additional content in museums. They've seemed like a sexy 'gee whiz' technology that delivers very little so far.*[108]

And she continues:

> *From my perspective, the biggest issue with how QR codes are deployed in museums is that there's very little information provided about WHY a visitor would want to scan a given code. There's often an object label, a code, and an unwritten mystery about what you'll get when you scan the code. When I visited one contemporary art museum last year, this mystery took on an almost poetic scale. Sometimes, I'd scan a code and get a 10-min video of the artist working on a piece. The next code would take me to someone's website. There was no consistency and few pointers to let me know what I'd get.*[109]

Nina Simons points out very clearly the risks of 'the explanation virus' I have described in a previous part of this work. Nancy Proctor's opinion, expressed in a Tweet from 2011, is even more emphatic *"Good Q! RT @sbhogarty: QR code aesthetics can be prohibitive in exhibition setting-how do we signify visual recognition? #mmonline #mtogo*", manifesting her scepticism on the use of QR codes at Brooklyn Museum she also adds: "*Still no silver bullet? ;-) MT @maesmf: @openexhibits: @archimuse: #qr codes @brooklynmuseum http://ow.ly/8kyFt #mtogo #museweb #SImobile*".

New implementations of Augmented Reality software permit a more transparent way to push information to visitors, for example as LayarVision[110]: "*Right now it can instantaneously detect up to 50 objects and combine them with location-based layers.*

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[108] Nina Simon, 'QR codes and visitor motivation', http://museumtwo.blogspot.it/2011/08/qr-codes-and-visitor-motivation-tell.html

[109] ibidem

[110] http://techcrunch.com/2011/08/02/new-layar-vision-recognises-real-world-objects-and-displays-ar-objects-on-top/

As Layar co-founder and General Manager Maarten Lens-FitzGerald, puts it: 'Mobile devices can finally 'see''". I will deepen the Augmented Reality issues further in this work.

3.3.1 3rd case study: Lascaux Virtual Museum

Coming back to the 2nd generation of virtual museum, a particularly spectacular example of this model is the Lascaux Virtual Museum. With an exact reconstruction of the cave built in 3D, visitors are guided to discover the beauty of the wall paintings. It can also be considered a walk around a gallery, but here I find the strong learning model prevalent.

3.3.2 4th case study: Internet Culturale

Another example of the 2nd Generation of Virtual Museums are the Italian Ministry for Culture's' 3D Virtual Exhibitions[111], where it is possible to view reconstructions in 3D of ancient buildings and to learn about them following a closed pattern.

3.4 3rd generation virtual museums – case studies

3rd generation

This virtual museum model includes all exhibitions using technology on-site, that is to say not existing exclusively on-line or on any other kind of support, but in the actual galleries of the museum. In this case interaction with the objects and / or information is mechanical, that is to say not mediated by a keyboard and/or mouse or console, but involves the visitor's body taken as a whole (for example installations that require sensors to be activated), or an action to be taken by visitor (touching, pulling, pushing, tapping on a screen). However there is no interactivity with the object/information on display. Visitors cannot add contents or comments; all they can do is use mechanical

[111] http://www.internetculturale.it/opencms/opencms/it/main/esplora/index.html?tipo=percorso3d

technology in order to view additional information on the objects on display in the gallery or to reveal extra contents. Examples of real museums include the first Science Centres in San Francisco, built in 1969 or La Villette in Paris. For a more comprehensive treatment of the Science Centres, refer to Amodio (Amodio, 2005). Other examples are info-kiosks in museums. VMs following this model include the first Virtual Museum in Italy, the Museo del IX Centenario, built in 1998, or the initial examples of museum installations carried out by Studio Azzurro in Italy, such as the Sarzana Museum, or the 'Fare gli Italiani' exhibition at Turin at the Officine Grandi Riparazioni, commemorating the 150th Anniversary of the Unification of Italy. There is also a learning aim in these models but the difference with the 2nd generation of virtual museums lies in the fact that visitors have to perform mechanical actions in order to access the paratextual contents; they are not simply forced on visitors, as is the case of audioguides or the virtual tour of Lascaux.

3.4.1 5th case study: Museum of the IX Centenary

The project of the Museum of the IX Centenary of the University of Bologna was intended to create a new type of museum, proposing narratives to be told by the multimedia objects on display. Spaces are offered as fascinating supports for the representations of objects, episodes, characters and 'theories' in which spectators are the protagonists of their own itineraries. The design, completed in the second half of 1999, was aimed at creating a work responding to the request of the commissioners for a space dedicated to the nine centuries of history of the University of Bologna, at the same time creating an innovative form of exhibition for temporary displays with the potential of a permanent laboratory.

The guidelines were:

1) to create a 'chamber of wonders' with a contemporary feel, for example the rooms of the Palazzo Poggi housing the scientific collections of the Academy of Sciences in the second half of the eighteenth century.

2) The need to represent the paradigms of the university that took shape in the city of Bologna: the storage, transmission and pursuit of knowledge and its parallel variations – past, present and future; time, space, and ritual.

The configuration of the environment, the general criteria for use and interaction of the information and ultimately the aesthetics of the exhibition; the need to make different types of information on the history of the university available to the public with the use of multi-vision techniques for the spectacularisation of spaces.

3.4.2 6th case study: the Museums of narration of Studio Azzurro

as noted by Alessandra Mottola Molfino in the Italia Nostra newsletter of 2010,

The role [of Museums] is to be resources of identity; to quote the great anthropologist Ernesto de Martino '... at the basis of the cultural life of our time is the need to remember a homeland, and to mediate through the concrete character of this experience our own relationship with the world'. In the age of global culture it is no longer necessary to make collections in a few centres of knowledge in capital cities, great libraries and encyclopaedic museums; this task is now carried out by networks of electronic information that can deliver all the world's knowledge to any home. It has become essential to recognize (and deepen) the cultural diversity and specificity of individual countries, and even small cultural histories: to present the cultural objects that belong to them in the places, contexts, landscapes where they were born. (Mottola Molfino, 2010, pp. 1-2)

The experiences of Studio Azzurro in recent years seem to me to be close to this awareness: with a strong technological focus, but moving away from technocentric attitudes aiming at all costs to study the wonder of the technique used in the clearest way possible; starting however from a reflection on the role of exhibitions and museums within a specific territorial, social and cultural context.

... the explosion of a 'multimedia' culture, reconfiguring models and methods for the transmission of knowledge, leading to changes in mindsets and behaviour and a reconsideration of past values and future projects. Perhaps it is precisely within this multi-

media, technological, interactive culture, that we can find a key, perhaps the most homoeopathic, for breathing life back into those places we usually perceive as institutions far removed from our daily lives, to use a metaphor that has guided our design so far. Technology, however, is not the only key. We must, as we have said, approach other, in our opinion, fundamental, elements such as Art and Territory. That is to say the tools, language and material needed to bring the concept of Learning closer, so as to reaffirm function and subject (people) that revolve around these elements and at the same time make them revolve. (Cirfino, 2012, p. 7)

Rethinking technology as no longer central to museums, but as purely instrumental in highlighting the role of heritage, society and realization. Its uses may be clever, showy or discreet but never self-reflective.

Technology is therefore an unavoidable challenge, but also an extraordinary opportunity. It offers powerful tools that allow us to collect, order and express data, in ways unthought of in the past. It manifests itself in multimedia language that gives life to narratives kinetically, fluidly and engagingly, but above all it is the language in which we communicate today, producing new forms of behaviour from within our imagination. It lies in the origin of the unavoidable medium hype that we've been suffering for years, but if this is upturned, we find the potential to reconnect to a common feeling, a channel for dialogue between different and distant elements as has not been the case for centuries. A language that recalls oral culture as an analogy upon which discursive thought and its characteristics have been built: indetermination, repeatability, immediacy, simultaneity, fragmentation and connectivity. People need to relate to this language to re-encounter familiarity, to understand and to express themselves, to give shape to the invisible or to rediscover its value.

At this point we can no longer speak of virtual museums, but only real museums sharing a mature technological awareness for reinventing themselves, inviting reflection and contemplation.

Museums are no longer just 'containers' of memory but places where meanings and identity are produced and defined collectively. This leads to the idea that the value of a museum is to be defined not only quantitatively (numbers of visitors) but also in terms of cultural development (how the issues presented have enriched the community). (Cirfino, 2012, pp. 4-7)

It is indeed very interesting how Paolo Rosa in his projects with Studio Azzurro, has developed, through technology, the idea of museum space, in line with the concept of Florence Pizzorni (an anthropologist working at the Musée des Arts et Traditions Populaires in Paris) of homo museograficus, an amusing being with two legs supporting a brain from which emerges an eye and we could add a nose and ears if we wanted to expand the faculty, while leaving him without hands in accordance with the sacred principle that in museums it is always forbidden to touch objects.

(Jalla in Gennaro, 2007, p. 13). Museum space for Paolo Rosa, is closely linked to territory, understood as a Genius Loci (Mottola Molfino, 2010, pp. 1-2): linked to the experiences of a community or even a single highly precise discipline, such as psychiatry, astrophysics, to recall certain recent experiences (Cirfino, 2012). Paolo Rosa's way of working produces a project within a space, requiring dialogue between the parties concerned (museum, designers, community, space), and in which technology becomes one of many tools to better structure dialogue between visitors and the community involved.

Space becomes an interpretative space on several levels, taking advantage of the technological potential that allows the paratext to be activated at different levels. The narrative museum of Studio Azzurro, in an example given by Paolo Rosa, presupposes the fact that spaces exist to stretch narratives at the expense of information that may be stored in the virtual world, thanks to technology; in opposition to the didactic, methodological, positivist characteristics of 'traditional' museums that weigh down visits today. This 'liberated' space is described in the early work of Studio Azzurro as 'the breathing museum' (Cirfino, 2007, p. 15), exemplified by the possibility that museums could store elsewhere informative, didactic elements thanks to technology, without diminishing their basic function as transmitters of information and the potential of learning. In this way visitors are freed from the obligation to read and learn, in favour of emotion and wonder: more or less what happened in the armoury of the Poldi Pezzoli Museum set up by Arnaldo Pomodoro (Andreini, 2007: 19).

3.5 4th generation virtual museums case studies

4th generation

For the 4th generation of VMs I have taken into consideration projects more similar to comprehensive and flat archives and therefore repositories of plain information with no objects on display. This category covers archive websites. Archives and libraries are marginal to my work, as I noted in the definition chapter, even if the world trend is to consider archives, libraries and museums as the three parts of a single whole. Tangible examples of this taxonomy are Archives and Libraries with the model of the Encyclopaedia, browsable in distributive time. An example of a VM would be Europeana, the purpose of which is to gather all European archives, including those of museums, into a single navigable repository, using some of the content sharing functions already in place at all existing major social networks, with some still to be defined. This example is relevant in this taxonomy because I support the convergence of libraries, archives and museums in a single global knowledge capacity, browsable from users/visitors by the web.

3.5.1 7th case study: Europeana

> Europeana is the present moment's most ambitious and controversial project. Its purpose is to gather all European archives, including those of museums, into a single navigable repository, using some of the content sharing functions already in place at all existing major social networks, with some still to be defined. The predecessor of this project was Michael, the EU project with the mission of recording all the digital resources of museums / archives in Europe (CD-ROMs, websites, 3D models, …).
>
> Europeana is controversial due to the issue of licensing. Up to now, Europeana had always required content licensed as Creative Commons 2.5 'non-commercial'

http://creativecommons.org/licenses/by-nc-sa/2.5/ which excludes categorically any reuse for commercial purposes since 2009. The controversy has recently flared up again because Europeana wishes the Creative Commons license 0

http://creativecommons.org/publicdomain/zero/1.0/ which does not prevent reuse of the project contents for commercial purposes, to be signed irrevocably by the institutions involved in the project.

This proposal has raised a furore among the subscribers to the mailing list of the project and Europeana partners. Museums, archives and libraries collect, preserve, manage, document, catalogue, exhibit, communicate, and promote the cultural and scientific heritage for which they are responsible along with associated information for public utility purposes (study, research, information, entertainment, etc.). Digital technologies offer powerful means to pursue institutional goals, and public cultural institutions usually give users free access to their digital content. However there is widespread fear among museum professionals that unknown external organizations may be allowed to create commercial products of any kind, as reported in the debate following the workshop, and the comments in the mailing list. Partners have strongly requested that any use of metadata by Europeana or by third parties for commercial purposes should be explicitly excluded. While in some institutional sectors the idea of reusing cultural information for commercial purposes is simply not welcome: "*Giving away a common good created with taxpayers' money for nothing is unacceptable*", whereas others have developed the opposite reasoning: "*For the very reason that data have been produced with public money, they should be allowed any type of reuse, even for commercial purposes*". Another problem is the renegotiation of licenses for the data entered from 2009 up to the present moment, after the

previous license, which excluded the commercial reuse of data in favour of the new. A further question is to understand the concern of museums and other institutions involved about signing an irrevocable agreement for a project that has a conclusion, and a limited life: What will happen to the data held by Europeana once the project is over? Museums cannot revoke the Creative Commons 0 agreement in the face of the as yet specified nature of Europeana up to the end of the project in 2015, when the project will have to rethink itself in order to allow for its own survival (it is hard to believe that Europeana will close in 2015, while it is more realistic to foresee that the project will mutate in some way, if only to allow the operating costs of servers, bandwidths and the staff involved).

3.6 5th generation virtual museums – case studies

5th generation

In this model, users create an experiment with the objects on display at the Museum, in a constructive and interactive model. This kind of virtual museum involves the idea of a community, not only a learning community such as a school visit accompanied by a teacher, but as a community of people sharing the same interest in the collection, in the objects and information on display in the museum. Creativity is an important component in this category, as is the fact that the community is linked by a strong idea of identity or by a strong professional personal interest in the heritage on display. An example of this model in tangible museums would be the museum's Community of Friends; a community with a strong interest in the collection, making initiatives such as special openings and becoming a focus group for the growth of the museum. In the virtual museum field, I would include all projects involving web 2.0 features, providing the possibility to discuss a particular topic, to share information, and most importantly, to add information and comments on the collection on display. These virtual museums

also tend to have a strong presence in Social Networks, although the Museum does not necessarily have to have a Twitter account or Facebook page. Examples of 5th generation virtual museums include the Brooklyn Museum or the Guggenheim New York experiment.

3.6.1 8th case study: Brooklyn Museum and Guggenheim Museum

I have dealt (Caraceni, 2011) on the case of the Brooklyn Museum, interaction with visitors has been created starting from direct digital connections between the curators of exhibitions and visitors, thanks to the virtual spaces inside the physical museum open to all who wish to have their say: blank walls made available for the use of graffiti artists, then photographed at regular intervals of time by museum staff and published on the Museum's Flickr channel for sharing, and video cameras made available for sharing visitors' impressions of the exhibitions on the Museum's own YouTube channel. These experiments have proved successful, although it must be admitted that Shelley Bernstein, the Brooklyn Museum's director of web communications, seems to have been resting on her laurels in recent years and has not been putting forward as many cutting-edge initiatives.

At the Brooklyn Museum the most interesting videos on the YouTube channel are now on display at the Museum itself, as part of the permanent or temporary collections.

A few months ago the Guggenheim Museum in New York presented interaction forums for use by curators, visitors and experts, following an initiative started by the Brooklyn Museum in New York. Unlike their predecessors, these fora are making waves all around the world.

These may be the 'ask a curator'[112] model; permitting users to deal with the themes and terms posed by contemporary art as well as the specific topics arising from the collections on display at the Museum. This allows all users not only to have paratextual information at their disposal on the different collections but also to hold conversations with curators and artists and to add content to the intangible heritage of the VM, intended here as a real interactive web 2.0 website of a community sharing the same interest, but also open to the general public.

And here we can find the realization of Roy Ascott's dream in 'The Telematic Embrace', talking about the possibilities of museum websites:

The website is a site of cultural compression, a sort of time hologram, in which any one part, approached at any one time from any one location, leads to all other parts in all other places: both interstitial and inter-sited. Here is to be found the redefined 'gallery' or museum whose internal structure and order are 'implicate.' Implicate, in the sense that artists, the originators of each processive art line, continued to add and amplify their creations, to enfold and entwine them in denser and denser connections and associations, and implicate also in the sense of creating a potential for the unfolding of an infinity of trajectories,

according to the myriad interactions and interventions of the world-wide viewing public. This is the very paradigm of a Net art gallery. Against the conventional sequencing of works on the wall that the traditional gallery would provide, here we get a collection of deseriated works, whose order of viewing and interconnection, both semantically and experientially, is wholly open, observer-dependent, and interactive. (Ascott, 2003, p. 347)

3.6.2 9th case Study: Adobe Museum

The Adobe Museum, created by the producers of the world's most important creative software, is a real virtual museum, holding temporary digital exhibitions with direct links to the artists[113]. Interactivity with visitors is only made possible by the real time interaction when an exhibition is open and there critics have pointed out issues over the difficulty in finding materials and information once the exhibitions are over.

[112] http://www.museumnext.org/2010/blog/new-post
[113] http://www.myawardshows.com/2011/webby_awards/adobe_museum/

3.6.3 10th case study: Gioventù ribelle (Rebel Youth)

The video game 'Gioventù Ribelle' (Rebel Youth) was released on March 17, on the occasion of the 150th anniversary of the Unification of Italy. The press release of March 11 hailed it as

a new video game linked to the wider project known as Gioventù Ribelle, part of the celebration of the 150th anniversary of the Unification of Italy. Produced by the Italian Videogame Producers Association Assoknowledge – Confindustria SIT, with the participation of students of the European Design Institute in Rome, the game was presented for the first time during the exhibition held at the Vittoriano Complex in Rome from November 3, 2010, and tested by the President of the Republic, Giorgio Napolitano, who appreciated the revolutionary and innovative idea. The game itself is a three-dimensional interactive adventure in which players have the opportunity to take on the role of a mysterious hero of the Risorgimento and experience first hand the process of unification of the Italian nation. The action takes place in three scenarios: the Roman Republic, the Siege of Gaeta and the capture of Rome, in a time span ranging from 1849 to 1870.

A project of this type cannot fail to be loved with its involvement of students, bringing their energy and enthusiasm to a project aiming to bring the history of the Risorgimento to young people in their own language. It was produced with the (non-economic) support of some important institutions: the Presidency of the Council of Ministers, the Minister of Youth, the Institute for History and Assoknowledge, part of the Confindustria group, combining all the major Italian video game producers.

But unfortunately something went wrong with the project. On the fateful day of March 17, the gamers downloading the game from the website realized that there were so many errors that it was almost unplayable; another problem was that it was undersized (there was a single game pattern that could be resolved fairly quickly), as well as its non-user-friendly complexity. By now enough is known about one of the main characteristics of the Internet community: people do not like to be made fools of and they will make use all the mechanisms available on the Internet in order to get their own bach. So the next day gaming' blogs and sites gave vent to the gamers' indignation, comparing Gioventù Ribelle to Big Rigs, taking up its unenviable mantle as the worst game in history.

The controversy spread to the website of the Corriere della Sera and even to its printed edition. Raoul Carbone, the game's creator, immediately defended himself saying that the project was not for profit and had been conceived as a means to verify the feasibility of producing quality videogames in Italy, attracting foreign investors (and this was a monstrous own goal, because of the great deal of negative publicity for Italy due to this product). For an example of general procedure in the industry the Duke Nukem Forever game was eagerly awaited by the videogaming community for several years, but its release was postponed year after year in order to avoid ridicule. Raoul Carbone and the game's official website went on to claim that

The design of the game, as the work of students achieved at no cost and without the technical and / or financial support of businesses or individual professionals from the sector cannot be defined as poor, nor can it be compared with commercial or even amateur products produced by independent developers already in possession of advanced technical skills.

However, these details did not appear on the game's official website on launch day, the anniversary of the Unification of Italy, and the game is no longer available for download, now appearing on the website as an 'alpha' version (which in computer jargon means a draft product almost certainly full of bugs), information that was not available on March 17. A letter sent to the Corriere de la Sera by the Italian Chapter of the GDA, the International Game Developers Association, said that "*presenting Gioventù Ribelle as a product that can compete with the big international names is in direct contradiction with the way the project was actually carried out by the admission of its own promoters*"

The moral of this sad story is that projects should be treated with the utmost care, even when dealing with young people and social networks, because Internet users can provide rewards and support (as we have seen above), but can be implacable if they feel they have been made fools of.

A year later, in March 2012, Rebel Youth: XX – The Breach: was announced[114]. This is the

[114] http://labreccia.wordpress.com/2012/03/18/xx-diveta-giovane-e-ribelle/

sequel to the project and is an interactive historical reconstruction of the taking of Rome on the morning of 20 September 1870. It was created with Unreal Engine technology from Epic, already used to create masterpieces such as Gears of War and Mass Effect, with drastic changes in the technology employed and the design team (this time professionals were used) promising to explore some of the scenes of a historic time and place in the first person: ten o'clock in the morning, near Porta Pia. The game was chosen by the Central Museum of the Risorgimento in Rome, with one million visitors a year, as a representative of interactive multimedia works within the 'Rebel Youth' programme and will be presented in its final version in the museum in two permanent installations by June 2012. It is already freely downloadable from the blog of the game in a beta version from July 21, 2012.

I will end this review of cases of communication with the Sukiennice Museum in Krakow. An Augmented Reality application was created in order to bring younger audiences to the museum's completely renovated collection, allowing visitors to see the drama of the paintings on display: the characters, the artists who painted them, along with additional material. Young people can also interact with the museum's collection through posters placed throughout the city, allowing contents to be shared on Facebook or other social networks, or even by sending text messages that are then published on a special platform. This campaign was highly successful with the public, making it impossible to book a visit in advance for months due to the huge number of visitors, increasing visits to the museum by 20% for the inhabitants of Krakow, an enviable figure for bringing residents to visit the museum in their own city.

3.7 6th generation virtual museums – case studies

6th generation

The last category in this taxonomy is the most interactive of all. In this case the

structure of the museum itself creates an experiment, involving visitors, curators, communities, schools and professionals. There are no historical examples of this ambitious project; however I would like to make reference to MuseoTorino as an example of a 'real' virtual museum.

3.7.1 11th case study: the MuseoTorino

The Museum of the City of Turin is the best and most ambitious virtual museum project in Italy and worldwide. MuseoTorino is also the first Italian project to be selected for Worldwide Excellence at The Best in Heritage, granted by EuropaNostra, ICOM, ICCROM and UNESCO. It covers the city of Turin, linked to a website that contains all information on the history of Turin over the millennia; information that can be recalled during a visit to Turin in the flesh.

MuseoTorino is not a just a new museum, but a completely fresh idea. A cross-cutting concept, both real and virtual at the same time, participative and in constant evolution, aiming to present Turin and the testimony of its history to its residents and guests, looking to the past with an eye toward the future (Jalla, 2010, p. 7).

Regarding the website, a visit to the museum starts from the exploration of the map of the present-day city: information and details about places, events, subjects and topics related to the city can be found by clicking on the marked points. Each place corresponds to a brief identification tag attached to a card catalogue, complete with notes and bibliographical and archive data, as well as links to the institutions referred to for further information. MuseoTorino can be searched by categories, themes and chronology. The museum's collection is continually growing thanks to the contributions and knowledge of the city offered by the city authorities, scholars, citizens and visitors. It is associated with an exhibition in the form of Multivision, in sync with screens presenting an interpretation of the city. A visit to the permanent historical exhibition offers a journey through time through the early settlement and

ancient, medieval, modern, and contemporary city. The exhibition was conceived by a scientific committee and elaborated by MuseoTorino. The contents can be explored following multiple pathways. The exhibition has been divided into five 'cities': a click on the name of the city leads to the introduction, an explanatory text with some suggestions for further reading. Each city can be visited in different periods of time, or by 'frame': selecting the significant date that appears at the top or the time span that appears at the bottom. Within each 'frame' are interactive maps that can be accessed through the tabs on the sites, an introductory text, a picture gallery and many links to places, events, themes, subjects relevant to the selected period. In each room there is a 'time bar', to facilitate orientation in the tour.

Taking the real city itself as a collection, in its very nature immobile, and the city in time and in constant evolution, not only in the past, but also in the present and future, MuseoTorino has had to acknowledge that the only possible form of existence could be that of a 'diffuse' museum – 'as big as the city' – and whose collection is also a 'living collection' – free to evolve and grow according to its own rules and not those of a museum. And so the configuration itself of the 'museum' had to change, adapting to a collection that can only be preserved in situ and respecting the fact that, as it has changed over the past it will also change in the future.

For this reason MuseoTorino has taken the form of a virtual location and interpretation centre, taking on both the task of preserving and communicating, not so much the objects that make up the collection, than the knowledge that they hold, making the museum an institution whose functions are to acquire, improve, maintain, document, communicate and undertake research, but with a change in the object, being no longer 'human testimonies and their environment', but rather their

knowledge.

The virtual tour of the city duplicates a real one that we might make in Turin today, with the streets and squares, the buildings surrounding them, but with the opportunity to discover, beyond what we can see now, their history and that of the people who built and lived in the places we walk past now. With this enhanced awareness of the legacy of the past and the extent to which time and events have cancelled, changed, added, the potential arises to imagine even in the future city, changes that can already be predicted by the effect of events.

Since March 2011, coinciding with the start of the celebrations of the 150th anniversary of the Unification of Italy, the Medieval Court at Palazzo Madama has become an open access exhibition space hosting a new generation display in the form of an 'immersive' multi-sensory event-show. The visitor passes from the sight of the plain from which Roman Turin emerged, to the city in late antiquity to the low and high middle ages, baroque and modern eras up to the contemporary metropolis in a journey through time intended to reconstruct the history of Turin at a glance.

To return to McLuhan's opinion on museums, I would like to report some of his thoughts on the Museum of the City of New York, and its relationship with New York itself:

> *DR. McLuhan: There is a wonderful example of oversimplification hanging in a junk yard – a sign that says, "Help Beautify Junk Yards. Throw Something Beautiful Away Today". This is a counsel that I think we all understand, and we're all engaged in. For example, the schoolmarm teaching grammar is engaged in throwing away most of the beauty of the English language.*
>
> *This came up after a recent experience of a Circle Cruise. The greatest surrealist gallery in New York is the cruise around Manhattan Island on the Circle Line. The objects on the shore, in all their fantastic incongruity, one environment around*

another – you never know what will happen next. Great, elegant structures framing broken down sheds and warehouses. I never saw any surrealist painting to equal the ordinary views you get around the Island, and of course mingled with them are the most magnificent, beautiful things.

Manhattan is an island and is a museum. *It probably should be preserved. Like people on other islands, the Manhattan population has taken to living in discontinuous, tribal space. Unlike any other space I know of except England, the space of Manhattan is discontinuous, nuclear and pocketlike. "You can't get there from here". This is true not only outside, but inside most homes. It's completely unconscious on the part of the dwellers in this area. The city also refrains to a large extent from story line. If you notice the directions on the posts and Street signs, they are the most minimal and suggestive. There is no story line to be found in New York signposts.*

I'm personally strongly in favour of story lines, especially when you're in a car. But the amount of complicated, non-visual space in this area is to be matched only by London, and I have never seen a comment about it by anybody. I never knew about it myself until a couple of months ago. What we have been saying is 'wrong' with the museum (if you can use that kind of value judgment) is that it isn't ***tribal*** *enough. It's too continuous and connected.* (Mcluhan, 1969, p.18)

3.7.2 12th case study: Second Life - metaverse experience

The experience of metaverse seems to be significant also for Roy Ascott's theories, in 'The Telematic Embrace':

To bring the Net gallery into the world, a world that can only associate meaning with materiality, and thus museums with ownership, space with security, walls with certainty, is to demand radically new cultural behaviour and to initiate, however tentatively, a new social process. (Ascott, 2003, p. 347)

Second Life gave me the opportunity to test my theories about a virtual museum that could be really comparable to real museums. Second Life is a metaverse based on a 3D space, and as I noted before if space is the medium of museums, virtual space is the medium of virtual museums. So what about a virtual museum built in a credible 3D world?

As we have seen in the previous chapters, in recent years there have been many attempts to build museums on a technological platform. None of these efforts were particularly successful for several reasons. One was the lack of a usable, shared, simple interface. Then, even if the platform worked, the lack of museal criteria

involved in the curatorial activity performed by IT and media professionals made the experiments fail.

Concerning the case of digital art, net art and technological representations, we must focus on the quotation below. This quotation, taken from the beginning of Jean Baudrillard's Simulacra and Simulation, where Baudrillard refers to Quoelet, explains very well my idea of a virtual space for representation and display of masterpieces.

The simulacrum is never that which conceals the truth. It is the truth which conceals that there is none.

The simulacrum is true. (Baudrillard, 1994, p. 1)

In my research I noticed that this question cannot be found in Ecclesiastes. It is an example of a simulacrum in Baudrillard's sense. There is no reality (i.e. text in Ecclesiastes) only the simulacrum is 'real'. And this concept takes us to the issues related to the essence of digital artworks: problems of authorship, of copies and originals, real consumption of real masterpieces, and technological consumption of digital masterpieces that can also include Benjamin's speculations on the reproduction and reproducibility of art (Benjamin, 1936).

Discovering the game called Second Life, I entered an intuitive, usable platform, made in 3D for 3D interactive contents, strongly interactive, and reasonably 'the' platform to create real 3D environment for people, researchers, learners and communities. Second Life is a 3D virtual world entirely built and owned by its residents. Since opening to the public in 2003, it has grown explosively and in 2008 it was inhabited by 4,709,191 people from all around the globe. Second Life has a fully-integrated economy architected to reward risk, innovation, and craftsmanship. Residents can create their own virtual goods and services. Millions of Linden Dollars

> change hands every month for the goods and services residents create and provide. This unit-of-trade is the Linden Dollar, exchangeable for US Dollars at a rate of 250:1. Because residents retain the IP rights of their creations, they can be exchanged them at various in-world venues.
>
> Second Life was also interesting for me because it is a game, and a mimicry game, according to Callois' definition (Caillois, 2001). It simulates real life, and real life can be a simulation of Second Life, in which people play, fall in love, establish friendships, do business, work, have fun and learn. Second Life represents a simulacrum of reality as defined by Baudrillard. We don't need real-world museums, if we can build museums in a simulation world, because it is a world too.

Finally, it was important for me to consider the strong innovation of the called Web 2.0. Web 2.0, a phrase coined by O'Reilly Media in 2004, refers to a perceived second generation of web-based services – such as social networking sites, wikis, communication tools, and folksonomies – that emphasize online collaboration and sharing among users. Its exact meaning remains open to debate, and Tim O'Reilly provided a compact definition of Web 2.0 in 2006:

> *Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them.* (Oreilly, 2004)

My experimentation in Second Life consisted of an exhibit of 2 installations curated by myself with my avatar Scar Undset; 'White Noise' by Mosmax Hax and '21 Sonnets' by Alpha Auer (aka. Elif Ayiter), that were put on display at the museum of The International Telematic University, Nettuno starting from December 20th 2007, 11.00 SLT.

'White Noise', which was also an award winner at Ars Electronica this year, is an architectural construct assembled out of the detritus of Second Life and this is the first

public showing of the work. ‘21 sonnets’, is a typographic installation of 21 Shakespearean sonnets. Although the two works were conceived of separately they have been merged into one cohesive whole which works in conjunction with the architectural space of the museum itself, for the purposes of this event.

This exhibit was displayed at University Nettuno's Island of Knowledge[115], the first electronic university in Italy. On the island could be found virtual classrooms, spaces for interaction between tutors, students and professos. Rector Maria Amata Garito wanted to create a museum, as a space of for amusement and entertainment for all the avatars of the Electronic University.

In one part of the island, according to my suggestions, the programmers built a glass pyramid that was to contain the museum's collection. It is interesting to note that at the beginning this pyramid had two floors and some stairs, because the programmers thought that avatars had to actually walk into the museum. This is nonsense, because one of the most singular characteristics of Second Life is the possibility to fly everywhere, but the second problem was the programmers materially ‘appended’ framed pictures on the virtual walls of the museum, representing masterpieces in jpg format. This was a complete misunderstanding of the potentiality and meaning of a virtual museum in the virtual space of Second life, that can offer much more than hanging a jpg of the Mona Lisa on a virtual wall. I can speak of this episode sympathetically because as I wrote for the 1st Generation of Virtual Museum, the naivety of IT specialists mean that they are often unable to understand the complexity of

[115] http://slurl.com/secondlife/International%20Telematic%20University/123/165/33

museums and the potentiality of interactivity in virtual spaces.

As Bearman states,

> *If the cultural barrier to acceptance of copyright for digital media can be overcome through collaboration and broad cultural re-education, there will remain numerous technological barriers to full implementation of interactive and hypermedia in museums.*
>
> *Until recently the most serious of these barriers was the poor visual quality of most interactive and multimedia products. For a community which prides itself on connoisseurship, television quality images, and even images displayed on high end engineering workstations, were simply inadequate to convey the detail and the richness of colour in unique objects of great cultural value.* (Bearman, 1992, p. 5)

In fact even if in ads and videos for Second Life it seems that this metaverse has a terrific image quality and 3D enhancement. However this depends on the client's computer and the quality of the graphic card installed by many users leaves a lot to be desired.

In my curatorial activity for this museum I asked for all the walls and intermediate floors to be destroyed and to allow the artists (Mosmax and Elif Ayiter) to build the two virtual installations.

> *The two installations were conceived of separately: I decided to utilize the ceiling of the huge glass pyramid and created a typographic construct made up of 21 of my beloved Shakespeare sonnets, leaving the floor to 'White Noise'. Mosmax ended up constructing staircases which join and merge the two installations, which works really well I think...* (Elif Ayiter AKA Alpha Hauer, on White Noise building)[116]

The Museum was opened for the ceremony of Christmas Greetings, the 20th December 2007, for all the students and professors of the University. The experience was highly successful and the installation inside the museum remained for some time for all the

[116] Elif Ayiter, Comment on Flickr page of the project

avatars that wished to visit the museum itself.

Even though this experiment took place a long time ago , I still believe it's significant for my research for two reasons:

1. The decision to destroy the floors and stairs goes in the direction of destroying the walls of the museum, making it into Malraux's 'museum without walls'

2. Experiences in Second Life highlight the correspondence between life on line and 'reality'. Even if Second Life has lost a certain amount of popularity and educational institutions that once had a strong presence in the metaverse are now abandoning it, everything that occurs in Second Life is still perceived as realistic by individuals.

> *While web 2.0 domains have provided unprecedented user interaction and participation online, the metaverse has taken further steps in creating an awareness that takes participating agents to an entirely new level, providing not only social interaction and participation but also presence. This notion of bodily presence provided through the three dimensionally embodied avatar, who is a highly responsive and influential virtual extension/counterpart of the human behind the keyboard, creates far deeper reaching implications than a mere novel display system or tool can indicate. New forms of embodiment, of presentation as well as perception are being materialized, as has also been previously the case in online games and simulations.* (Ayiter, 2012, p. 50)

3.8 Deepening on Augmented Reality

Most (but not all) of the augmented reality projects for museums lead to the virtual museum of the 6th kind. It is too early to consider augmented reality as the 'future of museums', or even of virtual museums, especially after the worldwide failure of projects involving QR codes that generated incredible hype, but were regularly disliked by visitors. The suggestion of the giant squid in William Gibson's novel Spook Country that introduced the concept of augmented reality is persuasive for all museum directors, but my taxonomy should also be taken into consideration as a suggestion for the

inclusion of more low-fi forms of interactions that can lead to great projects without all the technological hype.

Here I will use as a starting point the reply to a question, posed at a forum at the Whitney Museum of Modern Art, "*What will art museums be like in the future?*"[117].

Augmented reality **will help add context to museum objects**.

> *And I'm not talking about holding your phone up to look at a painting, I'm talking about info embedded in your eyeglasses that brings up interesting and relevant titbits of information as you spend time looking at each work, noticing where your eye wanders on the object and serving up related info that complements your unique viewing experience. They'll also continue evolving to become more social spaces --places not only for looking at and contemplating art, but for individual and collective art-making, and discussing larger social and cultural issues. Museums will be the cultural stewards of the (past and) future. (Julia K.)*

I would like to add an extra category to the taxonomy of virtual museums, concerning augmented reality experiences. The question of augmented reality is a very new from the point of view of museums. This type of visitor experience should be inserted in the order of special effects for visitors to an exhibition or permanent collection, as there are not yet many examples of visitor interaction at an exhibition within computer systems, only interaction between the visitor and paratextual information available on the collection on display. At the University of Bologna's Department of Computer Science, Professor Marco Roccetti and myself are conducting a trial shooting game (Roccetti, 2012) that visitors can already play within a temporary exhibition at the oldest virtual museum in Italy: the Museum of the IX Centenary; however, this experiment is still at an embryonic stage, and as such can only be presented at the most advanced technological conventions. So I feel I can say that to date augmented reality computer systems do not allow interaction between visitors. Dramatic technological progress also

[117] http://whitney.org/WhitneyStories/WhatDoYouThink?tbid=82

means that QR codes when applied to Augmented Reality are becoming obsolete[118].

Augmented reality (AR) experiments, thanks to the success of smartphones, are becoming more than a peculiar case of virtual reality, and allow visitors to find out more ways to connect with the heritage on display in the museum. The Venice Biennale this year has offered several AR journeys, as have an increasing number of museums such as MOMA, the British Museum, and others. On the other hand museums have discovered Twitter and new ways to communicate as a 'happy medium' with visitors, in an enhanced awareness of the role and the potential of the museum as a catalyst of experience, social awareness and citizenship. The focus in this paper is to create a definition of AR that fits museums so as to better understand AR in the actual museum communication mediascape, and the construction of an ideal path in order to locate experiments in AR in a more comprehensive picture that describes the technological tools to enhance the first aim of museums, that is to communicate their heritage.

Augmented reality in the field of cultural assets

The idea of using augmented reality (AR) systems in the field of cultural assets is increasing in two different directions: as an aid for tourists visiting cities, museums and holiday resorts, as a way to enhance a visit to a museum or location, and in the opposite direction, as a sophisticated aid for researchers in different fields such as archaeology, restoration and the preservation of artworks or sites of interest, and increasing areas for different applications.

The efforts in these three different areas are significant, as the technological efforts are

[118] http://www.layar.com/layar-vision/

always in proportion with the expected results, causing an imbalance between the dimension of the projects, the expected results and the effective results.

AR can be defined as a part of virtual reality, taking on the quality of enhancing the human perception of reality, adding information and permitting more efficient performance.

> *Augmented reality (AR) is a term for a live direct or an indirect view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics or GPS data. It is related to a more general concept called mediated reality, in which a view of reality is modified (possibly even diminished rather than augmented) by a computer. As a result, the technology functions by enhancing one's current perception of reality. By contrast, virtual reality replaces the real world with a simulated one.*[119]

In order to outline a brief history of AR, providing an example of an actual application, I would like to mention the London Museum AR layer.

> *The app leads you to various locations around London using either the map or GPS. Once you're there, click the '3D View' button, and the app will recognize the location and overlay the historical photograph over the live video feed of the real world, giving you a brief glimpse into how the past looked.*[120]

This app brings the heritage of the Museum itself into the hand of anyone who has a smartphone and the app, making it possible to browse a time capsule of reality, comparing the current London cityscape with its historical counterpart. This is one particular example of a case in which museum heritage crosses the threshold of the museum, coming out into the city. A different example can be made for another city museum, MuseoTorino, the Museum of Turin, that allows visitors to view the description of all the notable buildings and artworks located within the city walls by QR code.

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[119] http://en.wikipedia.org/wiki/Augmented_reality

[120] http://www.petapixel.com/2010/05/24/museum-of-london-releases-augmented-reality-app-for-historical-photos/

The appeal to museums of QR codes – and an internet of things – is immediately obvious: digital media can be 'attached' to physical objects by means of the small printout of a square code. Although QR codes themselves are essentially just web-address links, when connected to an online database of objects their possibilities become quite powerful. An object in the real world – a museum specimen – can be permanently linked with a growing and editable repository of online material, revealed to visitors through their smartphones or similar devices.

Recently a few start-ups have started to appear with mobile apps allowing you to point a smartphone at an object and view some kind of augmented reality object or information associated with it. Usually this has been done through the activation of some kind of QR code or similar. Others have started to appear with apps where no code is needed.

Thus today Layar, the largest of the mobile augmented reality platforms, is launching Layar Vision. As implied, Layar will now be able to recognise real world objects and show digital content on top of them. It works particularly well with posters, magazines and newspapers[121].

As quoted, the appeal of QR is obvious, but it is generating an immediate division in technological museum AR projects: QR codes to activate actions require a precise action by the user that is to snap a photo of the code itself. This represents a sort of boundary between reality and AR that the user must cross with an action. This is a limitation in AR applications that use QR codes to be activated (and there are many because smartphones have very few system requirements to 'understand' and enhance reality). But in this field there are several improvements, the first one being the new Layar feature known as Layar Vision[122].

[121] Jim Richardson, http://www.museumnext.org/2010/blog/qr-codes-and-museums

[122] http://eu.techcrunch.com/2011/08/02/new-layar-vision-recognises-real-world-objects-and-displays-

In the field of tourism and cultural assets, we can find systems that final users can employ to browse and augment reality with the two most common AR browsers as Layar and Junaio, on a mobile phone using IOS or Android. The smartphones required, generally expensive, stretches ICOM's definition of the museum in the Ethical Code of Museums which defends universal access to heritage[123].

However the restriction of expensive technology it is not comparable with other virtual reality systems composed of expensive hardware developed and constructed ad hoc, for example for archaeology and research purposes(Vlahakis, et al, 2002).

So the system requirements for browsing a tourist or cultural AR can be defined as a step forward in universal access for heritage, providing a wider range of people with the possibility to access restricted data.

There is still however much room for improvement among existing AR applications, where there is still a lack of in depth information, or in certain deplorable cases being limited to a different interface for browsing web information, adding nothing to reality.

Specific example: Venice Biennale

In order to make an example, I went to the 65th Biennale delle Arti in Venice, trying to finding out all the aids that AR system can give to a visitor, and to browse all the layers presenting tourist information, or art installations. This work is a benchmarking research to find out how technology can help visitors. To make an inventory, the AR layers that I used for this survey were:

- LAYAR:

ar-objects-on-top/ and http://www.layar.com/layar-vision/

[123] ICOM Code of Ethics, http://icom.museum/fileadmin/user_upload/pdf/Codes/code2006_eng.pdf

- Venice 2011
- Battling pavilions
- Invisible pavilion
- Shades of absence
- Sky pavilions

- JUNAIO:
  - Venice augmented by Amir Baradan

- APPS
  - I also used the iBiennale app made as a guide for the exhibition and also Christies Venice_ 2011 app, in order to make a comparison between a traditional and technological ways to browse the exhibition. I also used the common Twitter and Foursquare apps, and Foursqwar. It is possible to view a videocast on the Venice Biennale experience here: http://museum.i-sim.it/biennale2011.html

Visit to the Arsenale

The Arsenale part of the exhibition presented no known ARs layer apart from the most common AR tools (Flickr, Twitter, Wikipedia, in Junaio and Layar, present all over the world). In order to enhance my visit using a smartphone, I tried to use the iBiennale app, produced by La Biennale, supposedly free but I had to pay a fee of few euros for the catalogue. In this case there is nothing that can be said to be augmented, but rather a guide that does not seem to have been made for visitors to the Biennale exhibition (apart

from the frequent crashes of the app itself), but for visitors browsing from home. In the catalogue itself there are no images of the works on display, just generic works of the artist. The only interactive activity is to view the Biennale blog (not adding contents from the app), and to add artists to a personalized 'itinerary' on the map (of Arsenale, Giardini or Venice).

Visit to the Giardini

The Giardini otherwise offer many AR layers, as shown in the videos that I present. The most intriguing is 'Battling Pavilions' presented by the cyberartist group Manifest.AR and Sander Veenhof[124] In this layer the interactivity between visitors is represented by the possibility to build virtual pavilions inside Giardini, and to destroy the pavilions of other visitors, as expressed in the manifesto of the cyberartist group "*art should be real!"*

The second AR Layer is Sky Pavilions, made by ManifestAR artist John Cleater[125]. Here there is no interactivity, but the impression that is given relates to the giant squid in Gibson's 'Spook Country', one case of a novel dealing with AR. The idea of the use of AR related to art, and located and visible only in precise coordinates is powerful, but does not relate to the use of AR in museums, or for museum purposes.

The happy medium: Twitter for museums

The worldwide community of museologists is discovering Twitter as a means for museum communication. I personally find Twitter a powerful medium with a low-tech feel, highly sophisticated and revolutionary for museums, due to the variety of uses that

[124] http://sndrv.nl/battle and http://www.layar.com/layers/venicebiennial
[125] http://manifestarblog.wordpress.com/cleater-venice-2011/

it can be put to by a wider public base (not only iPhone or Android, also other OS). Also for the fun of 'hacking' it, and constructing ways to interact with heritage and other people. Comparing museums, and museum interaction to music, as M. M. writes in his blog[126], museums need a transformation, to find a different way to communicate with their visitors, in the same way that for example jazz, and classical music are different and bring about different reactions in their audience. To return to my Biennale visit, I must admit that I've seen much more interaction with Foursquare, Twitter and related software, than with the AR installation, or the iBiennale guide app. Many people added the Arsenale or Giardini locations in Foursquare, arriving to related software Foursqwar[127], that is a foursquare-based game involving 'conquering' or 'defending' a Foursquare location, full of buildings and people with virtual soldiers.

> *We need a happy medium. It breaks my heart when some well-intentioned audience member claps at the end of a first movement and is rudely shushed by others. I know that listening to and attending classical music concerts are supposed to be indicators of class and refinement, but student prices and rush tickets means the audiences represent a wider socio-economic diversity. I'm a good person, friendly and smart, but I hardly feel I represent the textbook definition of 'classy'. I go to these concerts. I don't think it makes you more classy to sit in fancy clothes and not clap until the end. I don't think it is more classy to wear tennis shoes and clap between movements (or even worse, the middle of the movement).*
>
> *I know the fear is once you loosen up the rules and 'allow' people to clap and cheer when the mood strikes, they will do it ALL the time. Maybe they will clap when something is bad, but they don't have the good sense to know it is bad. Then they are encouraging a performer who doesn't deserve it!!! Horrors. I feel the same way in museums. Talk if you need to talk. Okay, maybe I don't need to hear about your drinking binge last weekend, but if you are having a lively debate over an exhibit or the aesthetic value of a piece of artwork, have at it. Are the kids running around screaming because they are bored? Head home. Are they rushing to some cool 'thing' they just have to show you? Cool. Find joy in other people's joy. It takes less effort than disapproving and feels better too. Museum need a happy medium*[128]

Twitter opens the door to the possibility of increasing participation, happy participation

[126] http://museum-meanderings.tumblr.com/post/7339091905/make-some-noise
[127] http://projectzebra.com/foursqwar.php
[128] http://museum-meanderings.tumblr.com/post/7339091905/make-some-noise

for visitors and all interested people.

The first thought I had was about AR projects that I presented in the first part of this essay.

- Are we sure that AR is a happy (technological) medium for museums?
- AR means a lot of hard technological work backstage
- It can only be used by people who have an Android or Apple smartphone and excludes all others
- If an AR layer is opened outside or far from the museum, you won't be able to see anything or it malfunctions; people think it doesn't work and have get a bad impression.

On the other side, Twitter (and also Foursquare)

- starts from people outside the museum: they are crowd-generated and not imposed as an abstruse way to consult a guide or audioguide
- are strongly based on the idea of community, a concept that I am struggling to find in most AR projects I'm examining
- are fun: the joy of creating something sharing it with others

In a competition between hi-tech-augmented reality and low-tech Twitter competition, who will survive in the near future?

At this moment in time, AR projects cannot be said to encourage interactivity; this is also because interactivity between users in AR is very hard to create. I am presently

involved in an ambitious and innovative project for an interactive AR shooting game at the Palazzo Poggi University of Bologna Museum on Junaio, the only project I am aware of with interaction between museum visitors in an AR environment (Roccetti, et al., 2012).

As I noted in the definition chapter, a recent paradigm shift in museology has taken museums from being the repositories / display devices of 'objects', to being repositories/display devices of 'information' alongside 'objects' (Pearce, 1986; Washburn, 1984; MacDonald, Alsford and Philips, 1989). With AR the passage from objects to information is more visible, and enhances the museum experience.

On the other hand, the information that AR can add to the visit must be well measured to match visitors' expectations, and to permit visitor interaction.

> *How can we make the facts of these objects sing to the virtual visitor? How can we enable them to have an experience? The first requirement for museums is to recognize that the networked environment is interactive, and therefore can be user driven. It enables us to respond to the visitor rather than pump information at him. If used to its best purposes, the networked environment enables a user to construct an experience with personal meaning* (Pearce, 1986).

3.9 Conclusions – multimodality

It is also important to compare this taxonomy with of ICOM'S definition of museum.

> *A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment.*[129] (ICOM Statutes)

As noted previously, the stress on the institution is important considering virtual museums. If a virtual museum is created by a private individual, then it cannot be considered a virtual museum in accordance with the ICOM definition. The open character of the

[129] ICOM Statutes, Article 3 - Definition of Terms, adopted by the 22nd General Assembly (Vienna, Austria, 24 August 2007)

museum can also be seen in the on-line museum, together with the functions of ‘conservation’, ‘research’, ‘communication’ and ‘exhibition’, but one provision: universal access to heritage, that is to say the digital heritage of the virtual museum.

This argument opens up the question of the accessibility of digital objects, because in the same way as tangible museums, virtual museums must be accessible for all kinds of public: with disabilities, using any kind of device or PC, using easy-access plugins, just to make some few examples. This issue is too big to be discussed here

Only at this point of my thesis can I try to define completely the concepts of multimodality and multimediality that I mentioned in the title. I should mention here that the title of this thesis was the title I first presented to Plymouth University for the acceptance of my research. In these years of research my activity has gone in many different directions: at first the analysis of experiments in virtual reality, then a large portion of my research time was devoted to experiments in Second Life, the final part of my research going deep into museological issues. However I decided to keep the same title, because in the final stages of my research work, certain concepts became quite clear in my mind, and after having given a definition of multimediality at the end of the second chapter, at this point I can now specify better the concept of multimodality for museums.

Wikipedia defines multimodal (interfaces) in this sense:

> *Multimodal user interfaces are a research area in human-computer interaction (HCI).*
>
> *Two major groups of multimodal interfaces have merged, one concerned in alternate input methods and the other in combined input/output. The first group of interfaces combined various user input modes beyond the traditional keyboard and*

> *mouse input/output, such as speech, pen, touch, manual gestures, gaze and head and body movements. The most common such interface combines a visual modality (e.g. a display, keyboard, and mouse) with a voice modality (speech recognition for input, speech synthesis and recorded audio for output). However other modalities, such as pen-based input or haptic input/output may be used.*[130]

And also

> *The second group of multimodal systems presents users with multimedia displays and multimodal output, primarily in the form of visual and auditory cues. Interface designers have also started to make use of other modalities, such as touch and olfaction.*[131]

It now becomes simple now for me, after my definition chapters, the thoughts of McLuhan and other museologists and the case studies of my taxonomy of virtual museums, to understand how a museum is multimodal itself. The museum can be considered as the interface by which we keep in touch with and understand heritage. We have seen museums as centres of interpretation, museums that use audioguides to ass an audio channet to visual modalities, physically wandering around galleries as al way to enjoy exhibits, tactile augmented reality interfaces; all these differend media are currently used in museums. Museums are interfaces, multimodal interfaces. And so are virtual museums, especially if we refer to virtual museums that use augmented reality. A virtual visit to Lascaux, together with sound and visuals, is a multimodal interface-virtual museum, a point of access to the heritage at Lascaux heritage that cannot be visited physically any more.

[130] http://en.wikipedia.org/w/index.php?title=Multimodal_interaction&oldid=540611623
[131] ibidem

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